

#99-C-99168 Analysis of Ambulatory Vision
Care Services for Medicare Beneficiaries.
The Project Hope. Claudia L. Schur, Ph.D
and Curt D. Mueller, Ph.D.

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AN ANALYSIS OF AMBULATORY VISION CARE SERVICES
FOR MEDICARE BENEFICIARIES

Final Report

Claudia L. Schur, Ph.D.
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Curt D. Mueller, Ph.D.

July 1993

Submitted by:
Project HOPE Center for Health Affairs
7500 Old Georgetown Road, Suite 600
Bethesda, MD 20814

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1. INTRODUCTION

1.1 Background

Since the implementation of the prospective payment system for Medicare inpatient hospital costs, attention has focused on expenditures for physician services under Medicare Part B. These expenditures have been rising at a rate in excess of general inflation, with growth in Medicare enrollment explaining only a small portion of the increase (Berenson and Holahan, 1992).

Expenditures on vision care services, in particular, are of considerable interest to the Medicare program because they account for a relatively large share of Medicare expenditures. In 1990, Medicare spent slightly over \$5 billion on Medicare Part B services related to the provision of vision care. Over 90 percent of these expenditures were for services provided in an ambulatory setting, with almost half occurring in a physician's office (Project HOPE, 1992).

Ophthalmologists billed 74 percent of this total, or approximately \$3.7 billion. In fact, ophthalmology was the second-ranked specialty -- second to internal medicine -- in terms of number of dollars of Medicare allowed charges in 1988 (Berenson and Holahan and 1990). In 1987, changes in the Medicare program with respect to the participation of optometrists provided for optometrists to be considered "physicians" for services that they could legally perform. Following that change, charges for optometric services remained lower than comparable services provided by ophthalmologists. Optometrists accounted for only 4 percent of vision care billing in 1990 and other, non-vision care specialists for 22 percent.

In terms of the types of vision care services delivered, the most frequently provided were evaluation and management services -- either medical visits or specialist

evaluation and management services -- which accounted for 43 percent of vision care services billed by physicians. In contrast, 46 percent of vision care expenditures were attributable to lens-related surgery. While expenditures for one surgical procedure -- extracapsular cataract removal with insertion of lens -- grew at an annual rate of 29 percent from 1985 to 1988, overall, allowed charges for ophthalmological exams and diagnostic evaluations grew at a faster rate than ophthalmological surgery during this period (Holahan and Berenson, 1991).

Ophthalmologists' charges have also increased rapidly over time. Between 1985 and 1988, charges by ophthalmologists grew at an average annual rate of 14.8 percent (versus 12.2 percent for all physicians). In their review of the growth in Medicare physician services, Holahan and Berenson (1991) suggested that annual rates of growth "in excess of 7 percent is for the most part attributable to the growth in the volume and intensity of physician services."

The purpose of this report is to provide a more detailed look at the types of vision care services that are being provided to Medicare beneficiaries in ambulatory settings. The report focuses on who provides the services (i.e., ophthalmologist vs. optometrist vs. nonvision specialist) and what services are delivered together. Changes underway in how physicians are reimbursed for care make these issues particularly important.

There have been two sorts of changes in physician payment under Medicare which have affected and will continue to affect payments to ophthalmologists. The first is the implementation --in January of 1992 -- of the new Medicare Fee Schedule which reimburses providers based on the resource costs of providing services. Prior to implementation, HCFA expected that the average Medicare payment to ophthalmologists would fall by 35 percent and total payments would decrease by 16 percent by 1996 (Federal Register, 1991). In contrast, total payments to optometrists are expected to increase by 14 percent.

HCFA is also considering changing the method of reimbursement for services provided in outpatient settings. As DRGs are units of service for inpatients, outpatient service bundles would be defined for payment for ambulatory care services. Although many vision care services would be affected, little is known about variations in mixes of services that are billed by vision care specialists -- especially mixes of diagnostic and treatment services provided in physicians' offices.

1.2 Report Overview

This study provides an indepth look at ambulatory vision care services provided under the Medicare program. The analysis is exploratory in nature and focuses on the following issues:

- o the types of services provided by ophthalmologists vs. optometrists;
- o the extent to which nonvision care specialists deliver vision care services;
- o the impact of physician characteristics on the type and amount of vision care services billed;
- o the level of vision care services received by beneficiaries and how that varies by demographic characteristics;
- o the specific diagnostic vision care services delivered and the extent to which these are billed in conjunction with a medical visit;
- o the use of different visit billing codes by providers, in particular the use of regular visit codes by ophthalmologists and ophthalmology visit codes by non-ophthalmologists.

In order to explore these issues, claims data were organized into episodes of care. Episodes have been defined to include all vision care services as well as all services provided by a vision care specialist (i.e., ophthalmologists or optometrists). Two files were created: the first contains episodes of vision care services delivered to a sample of Medicare beneficiaries while the second consists of episodes delivered by a sample of

providers. The data sources, the specific billing codes used, and the process of file construction are all described in detail in Section 2 of the report.

Section 3 describes the findings from the beneficiary analysis while results from analysis of the provider file are presented in Section 4. With these two perspectives combined, one gains a more thorough understanding of expenditures for vision care services, how complementary services are delivered, and how charges vary by the types of services provided, the site of care, and other factors in the delivery of care. Findings will be important to payment reform efforts and because they will contribute to an understanding of provider incentives and market forces in the provision of vision care.

Section 5 reviews the study's major findings and discusses possible areas for further research.

2. DATA SOURCES AND FILE CONSTRUCTION

2.1 Sources of Data

The study relies on data from the 1990 Part B Medicare Annual Data (BMAD) Beneficiary and Provider Files. The Beneficiary File contains information on all claims submitted in 1990 for a five percent sample of Medicare beneficiaries (approximately 1.6 million persons). The file contains the following data items for all claims submitted under Medicare Part B:

- o procedure code (based on the AMA's CPT-4 codes);
- o Medicare allowed charge;
- o place of service;
- o Medicare carrier;
- o provider specialty and identification number;
- o beneficiary age, sex, and race;
- o beneficiary county and region of residence.

The Beneficiary File contains over 30 million records.

The Provider File contains information on all claims submitted in 1990 by a five percent sample of providers. Data items available include the following:

- o procedure code;
- o Medicare allowed charge;
- o place of service;
- o Medicare carrier;
- o provider specialty, identification number and zipcode;
- o beneficiary identification number.

Two variables were created to proxy the practice size of each provider. The first was the sum of allowed charges for all Medicare claims submitted by the provider -- this represents the total dollar volume of the provider's Medicare practice. The second variable is the sum of allowed charges for vision care claims only -- this represents the individual's Medicare/vision care practice. Clearly, both of these variables exclude

billings for non-Medicare beneficiaries and, therefore, understate to varying degrees a provider's actual practice size.

In addition, the Provider File was linked by county to the 1992 Area Resource File in order to allow for use of health resource supply variables such as the number of ophthalmologists and optometrists, and the number of hospital beds per capita. These variables are described in more detail in Section 4.2.

Several caveats should be noted about the BMAD Provider File. While the analyses in this report treat each provider identification number as a unique, individual practitioner, this is not always the case. An individual practitioner may bill using one of several provider identification numbers that has been assigned, including one for each location at which he/she practices, one for the group practice to which he/she belongs, and even one for the company which administers his/her billing. Thus, total expenditures billed under some IDs are for more than one provider, and billings under other IDs may represent only a portion of a provider's Medicare billings. It is not clear to what extent or even in which direction this affects the findings presented in this report.

Except where otherwise noted, all results are for the five percent samples described rather than for the entire Medicare population.

2.2 Identification of Procedural Codes

The 1990 Physician's Current Procedural Terminology (CPT) manual was reviewed in order to compile a complete list of ophthalmology visits and services. Over 250 codes were selected. In order to simplify the analysis, related services were grouped into families that correspond to specific types of procedures. The following major service families are employed in this analysis:

<u>Family</u>	<u>Type of Service</u>
Visits	
1	Regular Medical Visits
2	Consultations
3	Ophthalmologic Visits
8	Hospital Visits
Diagnostic Services	
4	Diagnostic Services
5	Diagnostic Maneuvers
6	Ophthalmic Ultrasound
7	Other Medical Services
Surgical Services	
9	Corneal Surgery
10	Other Anterior Segment Procedures
11	Glaucoma Surgery
12	Lens-Related Surgery
13	Vitreo-Retinal Procedures
14	Ocular Adnexa-Eyelids
15	Other Surgical Procedures
16	Anesthesia Procedures
17	Vision Care Supplies
18	Non-Vision Care Services

It should be noted that Family 18 consists of only those non-vision care services that are billed by either an ophthalmologist or optometrist. Services in Families 1 (office visits), 2 (consultations), and 8 (hospital visits) are also included only if billed by a vision care specialist or if provided along with other vision care services. A complete list of the specific CPT codes in each of the families is provided in the appendix.

2.3 Creation of Analysis Files

Extract files. Reduced data sets were created from both the Beneficiary File and the Provider File. The beneficiary extract contains records for all beneficiaries who either (i) received any Medicare-covered service from an ophthalmologist or optometrist; or (ii) received any of the selected vision care services or supplies.¹ For the provider extract file, all records were selected for providers who either (i) had a specialty code of ophthalmology or optometry; or (ii) submitted a claim for any of the selected vision care services or supplies. In both files, only those claims for services provided in a physician's office, an ambulatory surgery center (ASC), or in the outpatient department of a hospital were included.² Approximately 9 million records were contained in the beneficiary extract file and approximately 3.2 million records were included in the provider extract file.

Construction of Episodes. Analysis of billing patterns for vision care services required the linking of related claims at the beneficiary level. These groups of claims, referred to here as episodes, are linked together based on the commonality of the type of service delivered and on the service dates. Given that no diagnostic information is available in the database, they are not intended to be episodes in a clinical sense.

Episodes were created from each of the extract files described above. Those episodes from the beneficiary extract file span all of the Medicare-billed services for a given beneficiary and may include more than one provider. Episodes from the provider extract file, on the other hand, encompass all of the Medicare-billed services delivered to

¹ Beneficiaries eligible for Medicare through the ESRD program were excluded unless part of the 5 percent sample.

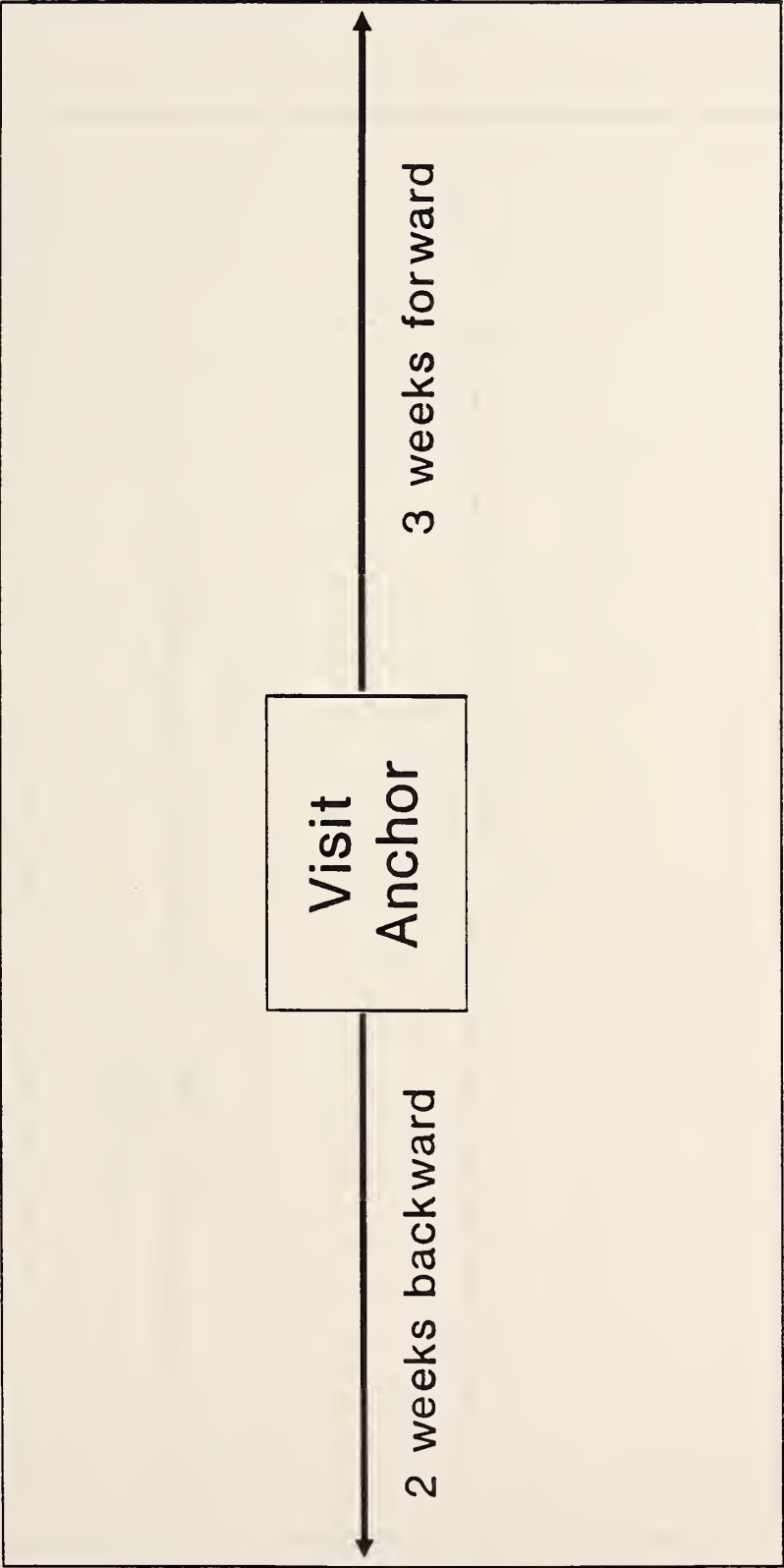
² Services with a place of service code of "other" were also extracted. These eventually accounted for 1.3 percent of all episodes. In addition, Family 8 claims (hospital visits) were extracted where the place of service code indicated an ambulatory setting. Overall, their numbers were so small that these claims were excluded from separate family-level analyses.

a single beneficiary by a given provider. Each of the latter episodes represents a provider-beneficiary pair and does not include any services delivered to a given beneficiary by other providers.

Since the algorithm developed to arrange the data into episodes determines the range of possible analytical outcomes, the algorithm received careful attention. One of the primary objectives of the analysis was to examine the range of services provided along with a visit; thus, visits were used as the centerpiece or anchor of episodes. Visits were initially defined to include Families 1 (regular medical visits), 2 (consultations), 3 (specially-coded ophthalmological visits), and 8 (hospital visits). A window of two weeks prior to a visit and three weeks after a visit was set to capture other services (i.e., diagnostic or surgical procedures, supplies) delivered in conjunction with a visit (see Figure 1). It was assumed that these services could either precede or follow the visit; in the former case, a procedure might prompt a visit (e.g., removal of foreign matter with a followup visit) or, in the latter case, a procedure might be ordered during a visit and scheduled for a later date. If a visit claim was found within the window of another visit, these visits and their related procedures were linked together in one episode, as shown in Figure 2.

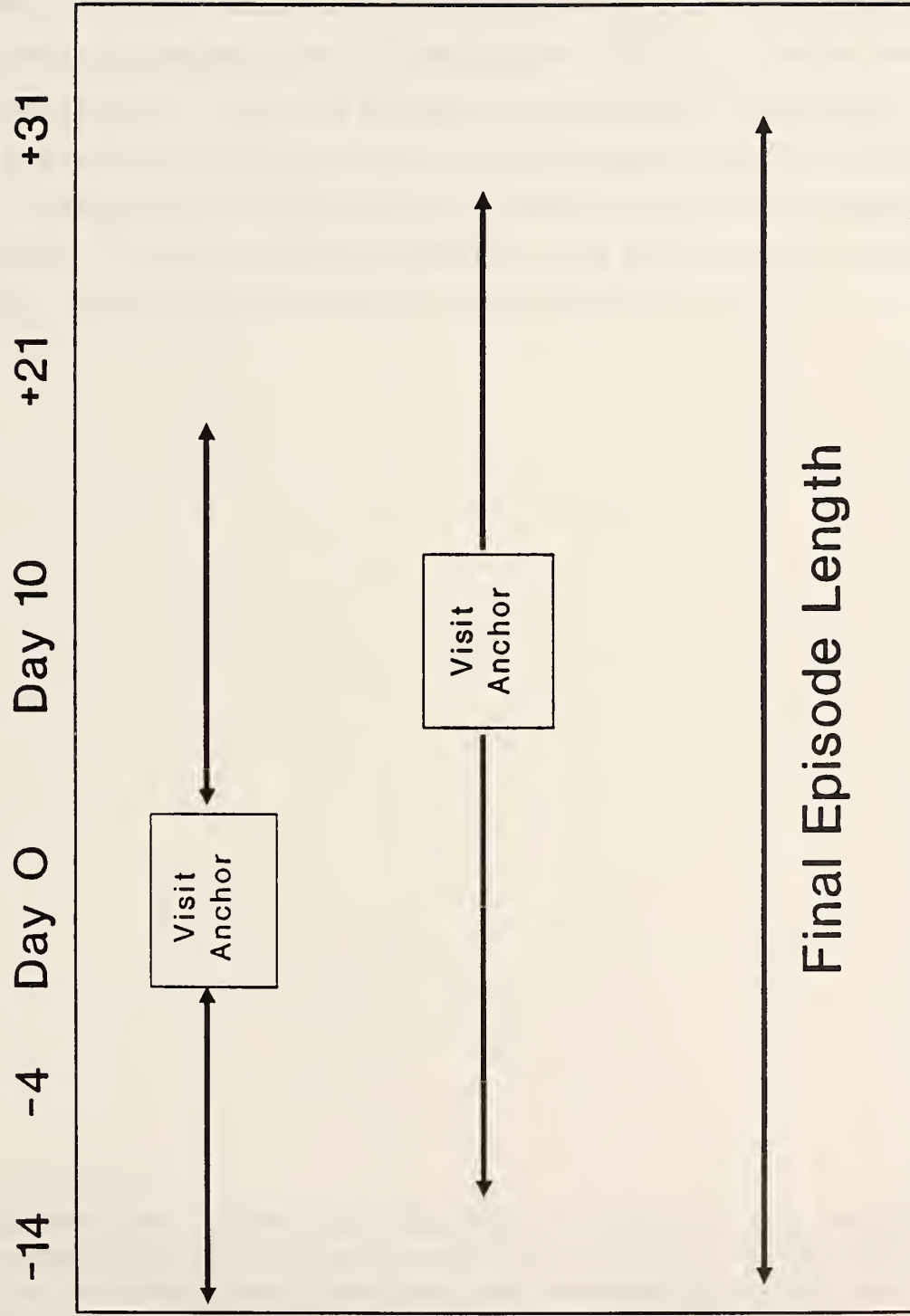
Any services not delivered in conjunction with a visit were treated as separate, stand-alone episodes and linked to other procedures only if they were provided on the same day. In order to ensure that all episodes were primarily related to the delivery of vision care, two types of episodes were deleted. First, any episode that consisted solely of Family 18 claims (nonvision care services provided by a vision care specialist) was deleted from the analysis file. Second, episodes made up of claims from Families 1, 2, or

Figure 1. Construction of Vision Care Episodes



Note: All Claims for diagnostic and surgical procedures as well as medical supplies submitted in this window are part of the episode.

Figure 2. Construction of Vision Care Episodes with More Than One Visit



Note: If one visit anchor falls within the window of another visit anchor, the episode is extended.

1. The first part of the paper is devoted to the study of the

properties of the solutions of the system

$$\frac{dx}{dt} = Ax + B u, \quad x(0) = x_0, \quad u(t) \in U$$

where A and B are $n \times n$ and $n \times m$ matrices, respectively,

and U is a compact set in m -dimensional space.

The second part of the paper is devoted to the study of the

8 (visits not specially coded as ophthalmology) and not billed by a vision care specialist were omitted from the file.³

A total of 1,003,996 vision care episodes were created from the Beneficiary File using the procedures outlined above. Of these episodes, 12,627 or 1.3 percent included more than two providers. These were excluded from the analysis because of their small frequency and because bundling for purposes of reimbursement would pose special problems. Findings from the analysis of the Beneficiary File episodes are presented in the next section. There were 1,081,386 million vision care episodes created from the Provider File. These episodes are described in Section 4 of this report.

³ Claims from these episodes (i.e., visits billed by a nonvision care specialist) were originally extracted in order to determine whether they were provided along with vision care services. Once the episodes were created and it was determined that no vision care services were received in the specified time period, the entire episode was deleted.

3. USE OF VISION CARE SERVICES BY BENEFICIARIES

3.1 Overview

In this section, we present descriptive statistics from the analysis of the Beneficiary File. Of the five percent sample of beneficiaries analyzed, 538,959 Medicare enrollees received at least one vision care service in 1990. Extrapolating to the entire Medicare population, this represents approximately 11 million persons or one-third of all beneficiaries. Initial statistics presented here are for individual vision care services rather than episodes of care.

Total allowed charges for vision care services for the 539,000 beneficiaries in our analysis were \$189 million. This would represent approximately \$3.8 billion for the Medicare population as a whole. The percent distribution of charges (for the five percent sample) across the vision care families is shown in Table 3-1. Slightly over half of all charges (51.6%) were for lens-related surgery, primarily cataract removal and lens insertion. Almost 20 percent of charges were attributable to evaluation and management services (visits), almost 10 percent to diagnostic services, and 14.3 percent to other surgical services.

The distribution of the number of claims across service families (as shown in Table 3-2) is markedly different than the distribution of charges. Almost sixty percent of the 1.7 million claims submitted for vision care services were for visits, three times the proportion attributable to visit charges. Two-thirds of the volume of visits were for the specially-coded ophthalmology visits. Surgical services, on the other hand, accounted for only 9 percent of all claims (compared to almost two-thirds of charges). Vision care supplies accounted for 10 percent of claims and 4 percent of charges. The distribution of claims and charges across vision care families is also shown in Figure 3.

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Table 3-1: Total Allowed Charges for Medicare Part B Ambulatory Vision Care Services^a, 1990: Percent Distribution by Vision Care Family

<u>Vision Care Family</u>	<u>Total Allowed Charges</u> (in thousands)	<u>Percent Distribution</u>
Total Medicare Population ^b	\$3,780,020	N/A
All Families (5% sample)	\$189,001	100.0%
Visits		
Medical visits	7,915	4.2
Consultations	1,638	0.9
Ophthalmologic visits	26,683	14.1
Diagnostic services		
Diagnostic services	6,395	3.4
Diagnostic maneuvers	6,385	3.4
Ophthalmic ultrasound	4,678	2.5
Other medical services	413	0.2
Surgical services		
Corneal surgery	1,582	0.8
Other anterior segment procedures	3,004	1.6
Glaucoma surgery	6,237	3.3
Lens-related surgery	97,583	51.6
Vitreoretinal procedures	11,541	6.1
Ocular adnexa-eyelids	2,808	1.5
Other surgical	1,908	1.0
Anesthesia procedures	7	0.0
Vision care supplies	8,011	4.2
Nonvision care services ^c	2,213	1.2

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.

^b Estimate from 5% sample multiplied by a factor of 20.

^c Included only if determined to be part of vision care episode.

Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

Table 3-2: Number of Claims for Medicare Part B Ambulatory Vision Care Services^a, 1990: Percent Distribution by Vision Care Family

<u>Vision Care Family</u>	<u>Number of Claims</u>	<u>Percent Distribution</u>
Total Medicare Population ^b	33,196,500	N/A
All Families (5% sample)	1,659,825	100.0%
Visits		
Medical visits	296,658	17.9
Consultations	20,099	1.2
Ophthalmologic visits	666,604	40.1
Diagnostic services		
Diagnostic services	124,228	7.5
Diagnostic maneuvers	123,408	7.4
Ophthalmic ultrasound	53,928	3.2
Other medical services	9,449	0.6
Surgical services		
Corneal surgery	1,974	0.1
Other anterior segment procedures	4,966	0.3
Glaucoma surgery	7,585	0.5
Lens-related surgery	93,991	5.7
Vitreoretinal procedures	13,750	0.8
Ocular adnexa-eyelids	12,752	0.8
Other surgical	14,383	0.9
Anesthesia procedures	165	0.0
Vision care supplies	168,824	10.2
Nonvision care services ^c	47,061	2.8

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.

^b Estimate from 5% sample multiplied by a factor of 20.

^c Included only if determined to be part of vision care episode.

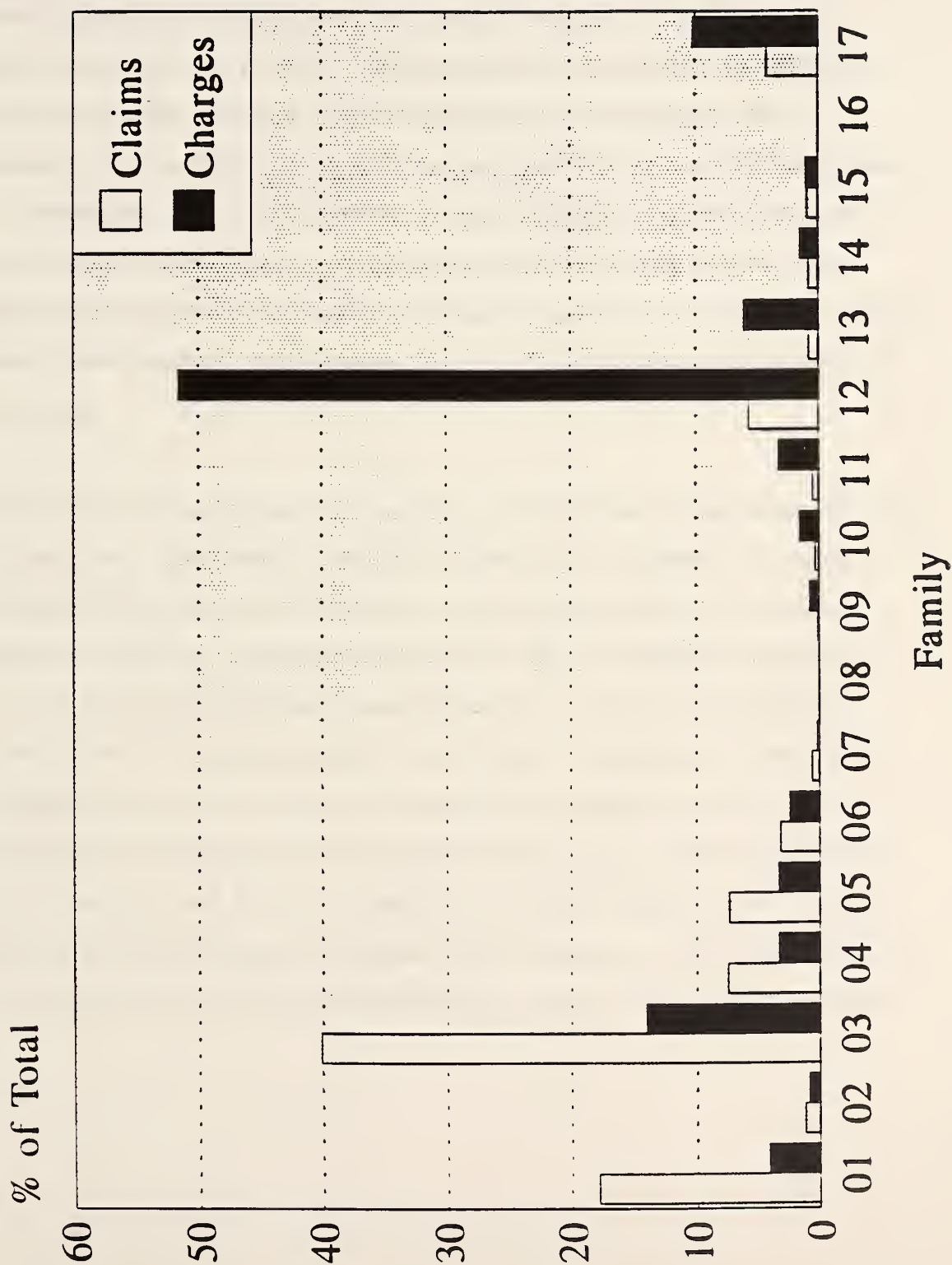
Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

The following table shows the results of the experiments conducted on the 10th of June 1881, at the Agricultural Station, Cambridge, Mass. The experiments were conducted by Mr. J. H. Comstock, and the results were published in the 10th volume of the *Annals of the Entomological Society of America*.

Experiment	Number of flies	Number of eggs	Number of larvae	Number of pupae	Number of adults
1	100	100	100	100	100
2	100	100	100	100	100
3	100	100	100	100	100
4	100	100	100	100	100
5	100	100	100	100	100
6	100	100	100	100	100
7	100	100	100	100	100
8	100	100	100	100	100
9	100	100	100	100	100
10	100	100	100	100	100
11	100	100	100	100	100
12	100	100	100	100	100
13	100	100	100	100	100
14	100	100	100	100	100
15	100	100	100	100	100
16	100	100	100	100	100
17	100	100	100	100	100
18	100	100	100	100	100
19	100	100	100	100	100
20	100	100	100	100	100
21	100	100	100	100	100
22	100	100	100	100	100
23	100	100	100	100	100
24	100	100	100	100	100
25	100	100	100	100	100
26	100	100	100	100	100
27	100	100	100	100	100
28	100	100	100	100	100
29	100	100	100	100	100
30	100	100	100	100	100
31	100	100	100	100	100
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33	100	100	100	100	100
34	100	100	100	100	100
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65	100	100	100	100	100
66	100	100	100	100	100
67	100	100	100	100	100
68	100	100	100	100	100
69	100	100	100	100	100
70	100	100	100	100	100
71	100	100	100	100	100
72	100	100	100	100	100
73	100	100	100	100	100
74	100	100	100	100	100
75	100	100	100	100	100
76	100	100	100	100	100
77	100	100	100	100	100
78	100	100	100	100	100
79	100	100	100	100	100
80	100	100	100	100	100
81	100	100	100	100	100
82	100	100	100	100	100
83	100	100	100	100	100
84	100	100	100	100	100
85	100	100	100	100	100
86	100	100	100	100	100
87	100	100	100	100	100
88	100	100	100	100	100
89	100	100	100	100	100
90	100	100	100	100	100
91	100	100	100	100	100
92	100	100	100	100	100
93	100	100	100	100	100
94	100	100	100	100	100
95	100	100	100	100	100
96	100	100	100	100	100
97	100	100	100	100	100
98	100	100	100	100	100
99	100	100	100	100	100
100	100	100	100	100	100

The following table shows the results of the experiments conducted on the 10th of June 1881, at the Agricultural Station, Cambridge, Mass. The experiments were conducted by Mr. J. H. Comstock, and the results were published in the 10th volume of the *Annals of the Entomological Society of America*.

Figure 3
Distribution of Claims and Charges by Procedure Family



Of those Medicare beneficiaries using at least one vision care service during 1990, 81 percent received one of the specially-coded ophthalmology visits (see Table 3-3). The second most commonly provided service was a regular medical visit: 30 percent of beneficiaries had at least one of these. Thirteen percent of persons were billed for a visual field exam or other Family 5 diagnostic maneuver, eleven percent for an ophthalmoscopy or other Family 4 diagnostic service, and nine percent had lens-related surgery. It should be noted that the number of these diagnostic tests provided may be far greater than that reported here; our estimate reflects only those tests for which claims have been submitted, while ophthalmologists frequently do not submit a separate bill for these procedures but, rather, choose the visit level code based on the extent of diagnostic testing.

For beneficiaries using vision care services, average allowed charges for 1990 were \$351 (see Table 3-4). This amount covered 3.1 claims and 1.8 episodes, on average. Selected statistics about the use of vision care services are presented by beneficiary characteristics in Table 3-4. It should be noted that, with no diagnostic information available, the data presented indicate broad differences in use by the demographic characteristics shown. We cannot control for differences in conditions or severity; the focus is, instead, on the overall level of services provided. Mean charges per person increased with age, with charges of \$271 for persons less than 65 years of age, \$302 for those 65 to 74 years old, and \$404 for beneficiaries 75 years of age and over. Females had slightly higher average charges than males (\$359 compared to \$340) and charges for nonwhites were higher than those for whites (\$442 for blacks, \$421 for other nonwhites

Table 3-3: Percent of Beneficiaries^a with One or More Claims^b from Vision Care Family, 1990

<u>Persons Receiving Vision Care Services:</u>	
	<u>Percent with One or More Claims</u>
<u>Vision Care Families</u>	100.0% (n=538,959)
Visits	
Medical visits	29.8
Consultations	3.5
Ophthalmologic visits	80.8
Diagnostic services	
Diagnostic services	13.0
Diagnostic maneuvers	15.9
Ophthalmic ultrasound	8.3
Other medical services	1.4
Surgical services	
Corneal surgery	0.3
Other anterior segment procedures	0.6
Glaucoma surgery	1.0
Lens-related surgery	11.5
Vitreoretinal procedures	1.6
Ocular adnexa-eyelids	1.6
Other surgical	1.8
Anesthesia procedures	0.0
Vision care supplies	12.1

^a As proportion of beneficiaries from 5% sample who received vision care services.

^b Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.

Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

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OFFICE OF THE DEAN OF STUDENTS

STUDENT INFORMATION		ACADEMIC RECORD	
NAME	STUDENT ID	COURSE	GRADE
ALLEN, JOHN	12345	PHYSICS 101	A
BROWN, SARAH	23456	CHEMISTRY 202	B
CHEN, MICHAEL	34567	BIOLOGY 101	C
DAVIS, EMILY	45678	HISTORY 201	D
FERNANDEZ, CARLOS	56789	PHILOSOPHY 101	F
GILBERT, LUCAS	67890	COMPUTER SCIENCE 101	A
HARRIS, JESSICA	78901	PSYCHOLOGY 201	B
JOHNSON, DAVID	89012	ECONOMICS 101	C
KIM, SOYOUNG	90123	LANGUAGE 101	D
LEWIS, ALEXANDER	01234	ARTS 101	F
MARTIN, OLIVIA	11223	PHYSICS 201	A
MURPHY, NATHAN	22334	CHEMISTRY 101	B
NEEDHAM, RYAN	33445	BIOLOGY 201	C
OLIVER, HANNAH	44556	HISTORY 101	D
PARKER, JACOB	55667	PHILOSOPHY 201	F
ROBERTS, KYLE	66778	COMPUTER SCIENCE 201	A
SCOTT, LAYLA	77889	PSYCHOLOGY 101	B
SMITH, BENJAMIN	88990	ECONOMICS 201	C
THOMPSON, ZOE	99001	LANGUAGE 201	D
WALKER, ADAM	00112	ARTS 201	F
WILLIAMS, EMMA	11223	PHYSICS 301	A
WYATT, NOAH	22334	CHEMISTRY 301	B
YOUNG, ISABELLA	33445	BIOLOGY 301	C

Table 3-4: Charges for and Use of Vision Care Services^a by Beneficiary Characteristics

Beneficiary Characteristics	Number of Persons^b	Average Allowed Charge	Average Number of Claims	Average Number of Episodes
	Per Beneficiary			
Total	538 ,959	\$351	3.1	1.8
Age				
Less than 65	4.1%	\$271	2.6	1.6
65 - 74	46.5%	\$302	2.8	1.7
75 and over	48.0%	\$404	3.4	2.0
Sex				
Male	34.5%	\$340	3.0	1.8
Female	63.6%	\$359	3.1	1.9
Race				
White	89.1%	\$343	3.0	1.8
Black	5.7%	\$442	3.7	2.1
Other	1.9%	\$421	3.3	1.8
Region				
Northeast	23.4%	\$334	3.2	1.9
Midwest	23.9%	\$332	2.9	1.8
South	34.7%	\$360	3.2	1.8
West	15.9%	\$383	3.0	1.8

^a Limited to the following service sites: physician office, hospital outpatient departments, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.

^b Persons receiving vision care services, 5% sample. Percentages may not sum to 100 due to missing values.

Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

Page 1 of 1
 Date: 12/12/2012
 Time: 14:00:00

Item	Quantity	Unit Price	Total Price	Remarks
1	10	100	1000	Item 1
2	5	200	1000	Item 2
3	15	50	750	Item 3
4	20	30	600	Item 4
5	10	150	1500	Item 5
6	8	125	1000	Item 6
7	12	75	900	Item 7
8	18	40	720	Item 8
9	25	20	500	Item 9
10	30	15	450	Item 10

Total: 10000
 Grand Total: 10000
 Date: 12/12/2012
 Time: 14:00:00

and \$343 for whites).¹ Average expenditures for persons residing in the West were higher than for other regions. The pattern of claims and episodes per beneficiary was similar to that of charges: older persons had more claims and episodes as did black beneficiaries.

Of persons using ambulatory vision care services, 85 percent received those services in a physician's office. As shown in Table 3-5, mean charges per beneficiary for services provided in a physician's office were substantially lower than in other settings. These charges were \$127 compared to \$403 in an outpatient hospital setting, \$1,162 in an ambulatory surgery center (ASC), and \$1,688 for persons who received services at more than one site. Clearly, different types of services are being provided in each of these settings, with the average charge per claim ranging from \$53 in a physician's office to \$646 in an ASC. The number of services varies substantially only for persons receiving care at more than one place.

Table 3-5 also presents statistics on the use of services by provider specialty. Two-thirds of beneficiaries saw an ophthalmologist for all of their vision care services. Average allowed charges for these persons were \$244 and the average number of claims was 2.6. Charges were comparable for beneficiaries who obtained care from a nonvision specialist, though the charges represented a smaller number of claims.² For the 15 percent of enrollees using optometrists, however, mean charges were substantially lower

¹ It should be noted that 5.7 percent of all beneficiaries receiving vision care services were black compared to 8.7 percent of the Medicare population as a whole. Racial differences in the incidence and treatment of glaucoma-related blindness have been reported in the literature, including Javitt et al. (1991) and Tielsch et al. (1990).

²Nonvision care specialist refers to any provider other than an ophthalmologist or optometrist. These include physicians who specialize in general or family practice or internal medicine as well as medical supply companies or prosthetist/orthotists.

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Table 3-5: Charges for and Use of Vision Care Services^a by Service Characteristics

	Number of Persons ^b	Average Allowed Charge	Average Number of Claims	Average Number of Episodes
	Per Beneficiary			
<u>Service Characteristics</u>				
All	538,959	\$351	3.1	1.8
Place of Service				
Physician Office	84.5%	\$127	2.4	1.6
Outpatient Hospital	0.9%	\$403	1.7	1.4
Ambulatory Surgery Center	0.1%	\$1,162	1.8	1.1
More than one place	14.1%	\$1,688	7.2	3.2
Provider Specialty				
Ophthalmology only	67.3%	\$244	2.6	1.8
Optometry only	15.1%	\$61	1.8	1.1
Other only	2.7%	\$233	1.9	1.3
More than one specialty	15.0%	\$1,143	6.7	3.0

^a Limited to the following service sites: physician office, hospital outpatient departments, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.

^b Persons receiving vision care services. 5% sample. Percentages may not sum to 100 due to missing values.

Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

1. The first part of the report is a general introduction to the project. It describes the purpose of the study, the objectives, and the scope of the work. It also provides a brief overview of the methodology used in the study.

2. The second part of the report is a detailed description of the methodology used in the study. It includes a description of the data sources, the data collection methods, and the data analysis methods. It also includes a description of the software used in the study.

Table 1: Summary of the data sources and data collection methods used in the study.			
Data Source	Data Collection Method	Data Type	Data Format
Survey Data	Online Survey	Quantitative	CSV
Interview Data	Semi-structured Interview	Qualitative	Text
Focus Group Data	Focus Group Discussion	Qualitative	Text
Document Data	Document Analysis	Qualitative	Text
Observation Data	Participant Observation	Qualitative	Text
Secondary Data	Public Data	Quantitative	CSV

3. The third part of the report is a detailed description of the results of the study. It includes a description of the findings, the conclusions, and the implications of the study. It also includes a description of the limitations of the study.

(\$61). Charges were dramatically higher for persons who were seen by more than one provider specialty, averaging \$1,143 and 6.7 claims per person.

Tables 3-6 and 3-7 provide a closer look at some of the data presented in previous tables. In Table 3-4, it is clear that average allowed charges per beneficiary are higher for blacks than for whites. Then, in Table 3-5, charges are shown to vary by place of service and provider specialty. The data in Table 3-6 shows that the difference in average charges between blacks and whites is not of the same magnitude across all places of service or provider specialties. Differences in allowed charges in physicians' offices are the most substantial; charges for black beneficiaries are \$176 compared to \$124 for whites, a difference of 42 percent. An even larger differential is seen by provider specialty with average allowed charges of \$365 for black beneficiaries served by ophthalmologists and \$237 for white enrollees. Since charges for those sites where surgical services are most commonly delivered are not substantially different, it appears, then, that blacks are receiving visits coded at a higher level or more separately-billed diagnostic services, the types of services most likely to be obtained in a physician's office.

Similar data -- average allowed charges per beneficiary presented by place of service and provider specialty -- are shown in Table 3-7 by U.S. Census region. From Table 3-4, the reader may recall that charges were higher in the West. However, when shown by place of service, charges are higher in the West only for episodes billed from ASCs or from more than one place of service. Charges for services provided in a physician's office are highest in the Northeast and those for services in the outpatient department of a hospital are highest in the South. In terms of provider specialty, charges in the West were higher in 3 of the 4 specialty categories. However, they were near the lower end of the range for beneficiaries who received care from ophthalmologists, which accounted for 67 percent of persons receiving care.

Table 3-6: Charges for Vision Care Services^a for Blacks and Whites by Service Characteristics

	Average Allowed Charge Per Beneficiary	
	Blacks	Whites
Place of Service		
Physician Office	\$176	\$124
Outpatient Hospital	409	390
Ambulatory Surgery Center	^c	1,117
More than one place	1,948	1,720
Provider Specialty		
Ophthalmology only	\$365	\$237
Optometry only	72	59
Other only	233	229
More than one specialty	1,229	1,198

^a Limited to the following service sites: physician office, hospital outpatient departments, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.

^b Persons receiving vision care services, 5% sample.

^c Cell size too small for reliable estimate.

Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

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 DIVISION OF THE PHYSICAL SCIENCES
 DEPARTMENT OF CHEMISTRY

RESEARCH REPORT

REPORT NO. 1000

TITLE	AUTHOR	DATE
1. The effect of temperature on the rate of reaction of hydrogen peroxide with ferrous sulfate in the presence of ceric sulfate.	J. H. Goldstein	April 1954
2. The effect of temperature on the rate of reaction of hydrogen peroxide with ferrous sulfate in the presence of ceric sulfate.	J. H. Goldstein	April 1954
3. The effect of temperature on the rate of reaction of hydrogen peroxide with ferrous sulfate in the presence of ceric sulfate.	J. H. Goldstein	April 1954

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 CHICAGO, ILL. 60637

Table 3-7: Charges for Vision Care Services^a by Region and Service Characteristics

	Average Allowed Charge Per Beneficiary			
	Northeast	Midwest	South	West
Place of Service				
Physician Office	\$153	\$102	\$124	\$132
Outpatient Hospital	404	378	466	397
Ambulatory Surgery Center	^c	1,068	1,002	1,227
More than one place	1,759	1,539	1,788	1,920
Provider Specialty				
Ophthalmology only	\$256	\$240	\$246	\$241
Optometry only	64	53	60	69
Other only	194	236	227	291
More than one specialty	1,102	1,100	1,241	1,409

^a Limited to the following service sites: physician office, hospital outpatient departments, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.

^b Persons receiving vision care services, 5% sample.

^c Cell size too small for reliable estimate.

Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

3.2 Vision Care Episodes

In order to gain a better understanding of what vision care services were delivered jointly, claims were linked together into service episodes as described in Section 2.3. A total of 991,369 episodes including claims from 3 or more providers are analyzed in this section. The average allowed charge per episode was \$191; episodes covered 3 days, on average, and included 1.7 claims.

Almost 90 percent of these vision care episodes took place in a physician's office (see Table 3-8). Average charges in this setting were \$83, compared to \$975 in an outpatient hospital setting and over \$1,500 in an ambulatory surgery center. While charges were 10 to 15 times higher in these latter settings, episodes were less likely to span more than one day and the number of services billed was not dramatically different than in a physician's office.

Vision care services in over three-quarters of the episodes were delivered by an ophthalmologist only compared to 13 percent of episodes billed by optometrists. Average allowed charges were almost three times as high for episodes with an ophthalmologist only (\$167) compared to those with an optometrist only (\$59). Episodes with a nonvision care specialist providing care were more expensive but accounted for only 4 percent of episodes. Those episodes encompassing more than one place of service or more than one provider specialty tended to be substantially longer and include more services than other episodes.

Episodes were distributed across U.S. Census regions similarly to the elderly population. There was some variation in average charges across regions, with the lowest charges in the Northeast (\$176) and the highest in the West (\$208).

where \mathbf{A} is the matrix of the system, \mathbf{b} is the vector of the system, and \mathbf{x} is the vector of the unknowns.

The matrix \mathbf{A} is a square matrix of order n , where n is the number of unknowns. The vector \mathbf{b} is a column vector of order n . The vector \mathbf{x} is a column vector of order n . The matrix \mathbf{A} is a square matrix of order n , where n is the number of unknowns. The vector \mathbf{b} is a column vector of order n . The vector \mathbf{x} is a column vector of order n .

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The matrix \mathbf{A} is a square matrix of order n , where n is the number of unknowns. The vector \mathbf{b} is a column vector of order n . The vector \mathbf{x} is a column vector of order n . The matrix \mathbf{A} is a square matrix of order n , where n is the number of unknowns. The vector \mathbf{b} is a column vector of order n . The vector \mathbf{x} is a column vector of order n .

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**Table 3-8: Episodes of Ambulatory Vision Care Services^a, 1990:
Selected Characteristics**

	<u>Percent Distribution Of Episodes</u>	<u>Average Allowed Charges</u>	<u>Average No. Days</u>	<u>Average No. Claims</u>
<u>All Episodes</u>	100.0% (n=991,369)	\$ 191	3.0	1.7
Place of service ^b				
Physician office	88.7	83	2.6	1.5
Outpatient hospital	3.2	975	1.4	1.2
Ambulatory surgery center	0.8	1,557	1.2	1.8
More than one place of service	6.0	1,199	11.8	3.9
Provider specialty				
Ophthalmology only	77.3	167	2.9	1.5
Optometry only	13.0	59	1.7	1.7
Other only	4.1	234	1.5	1.7
More than one specialty	5.6	791	9.4	3.8
U.S. Census Region				
Northeast	24.4	176	3.0	1.7
Midwest	23.6	186	2.8	1.6
South	35.2	196	3.2	1.7
West	16.1	208	3.0	1.6

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.

^b 13,208 episodes or 1.3 percent of total were coded as "other" place of service.
Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

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Sample	Conc.	Temp.	Time	Notes
1	0.1	25	10	
2	0.2	25	10	
3	0.5	25	10	
4	1.0	25	10	
5	2.0	25	10	
6	5.0	25	10	
7	10.0	25	10	
8	20.0	25	10	
9	50.0	25	10	
10	100.0	25	10	
11	200.0	25	10	
12	500.0	25	10	
13	1000.0	25	10	
14	2000.0	25	10	
15	5000.0	25	10	
16	10000.0	25	10	
17	20000.0	25	10	
18	50000.0	25	10	
19	100000.0	25	10	
20	200000.0	25	10	
21	500000.0	25	10	
22	1000000.0	25	10	
23	2000000.0	25	10	
24	5000000.0	25	10	
25	10000000.0	25	10	
26	20000000.0	25	10	
27	50000000.0	25	10	
28	100000000.0	25	10	
29	200000000.0	25	10	
30	500000000.0	25	10	
31	1000000000.0	25	10	
32	2000000000.0	25	10	
33	5000000000.0	25	10	
34	10000000000.0	25	10	
35	20000000000.0	25	10	
36	50000000000.0	25	10	
37	100000000000.0	25	10	
38	200000000000.0	25	10	
39	500000000000.0	25	10	
40	1000000000000.0	25	10	
41	2000000000000.0	25	10	
42	5000000000000.0	25	10	
43	10000000000000.0	25	10	
44	20000000000000.0	25	10	
45	50000000000000.0	25	10	
46	100000000000000.0	25	10	
47	200000000000000.0	25	10	
48	500000000000000.0	25	10	
49	1000000000000000.0	25	10	
50	2000000000000000.0	25	10	
51	5000000000000000.0	25	10	
52	10000000000000000.0	25	10	
53	20000000000000000.0	25	10	
54	50000000000000000.0	25	10	
55	100000000000000000.0	25	10	
56	200000000000000000.0	25	10	
57	500000000000000000.0	25	10	
58	1000000000000000000.0	25	10	
59	2000000000000000000.0	25	10	
60	5000000000000000000.0	25	10	
61	10000000000000000000.0	25	10	
62	20000000000000000000.0	25	10	
63	50000000000000000000.0	25	10	
64	100000000000000000000.0	25	10	
65	200000000000000000000.0	25	10	
66	500000000000000000000.0	25	10	
67	1000000000000000000000.0	25	10	
68	2000000000000000000000.0	25	10	
69	5000000000000000000000.0	25	10	
70	10000000000000000000000.0	25	10	
71	20000000000000000000000.0	25	10	
72	50000000000000000000000.0	25	10	
73	100000000000000000000000.0	25	10	
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76	1000000000000000000000000.0	25	10	
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89	20000000000000000000000000000.0	25	10	
90	50000000000000000000000000000.0	25	10	
91	100000000000000000000000000000.0	25	10	
92	200000000000000000000000000000.0	25	10	
93	500000000000000000000000000000.0	25	10	
94	1000000000000000000000000000000.0	25	10	
95	2000000000000000000000000000000.0	25	10	
96	5000000000000000000000000000000.0	25	10	
97	10000000000000000000000000000000.0	25	10	
98	20000000000000000000000000000000.0	25	10	
99	50000000000000000000000000000000.0	25	10	
100	100000000000000000000000000000000.0	25	10	

Prepared by: [Name]
 Date: [Date]
 Title: [Title]
 Department: [Department]
 Institution: [Institution]

Type of Service. Episodes were divided into five categories based on whether there was a visit and the type of services provided along with the visit.³ In many of the independent variables explored below, there is a minimum of variation. This may be due, at least in part, to the crudeness of the categorization method; however, with so much data to examine, the alternative risk was the creation of too detailed and complex a grouping method. Due to the large sample sizes, many small differences are statistically significant.

Two-thirds of episodes consisted of one or more visits only (see Table 3-9).⁴ Another 13.6 percent of episodes were made up of visit(s) and diagnostic claim(s), 2.9 percent were visits and surgical procedures, and 2.2 percent included a visit, a diagnostic service, and a surgical service. Fifteen percent of episodes included no visit.

While the majority of episodes consisted of visit claim(s) only, almost half of charges were attributable to episodes with no visit. Many of the episodes in this category are relatively high cost surgical procedures, primarily performed at ASCs. Only 14 percent of total allowed charges were accounted for by the 67 percent of visit-only episodes. Allowed charges per episode varied substantially depending upon the type of services provided (see Table 3-10). Visit-only episodes were at the low end of the spectrum at \$40, on average, while charges for episodes with visit, diagnostic, and surgery claims averaged \$1,525. Services in the latter episodes were often provided over a

³ In order to keep the number of groups to a minimum, episodes with medical supplies were excluded from this analysis. This reduces the total number of episodes from 991,369 to 914,325.

⁴It should be noted that routine eye examinations and refractions are not covered under Medicare; thus, it is interesting that such a high proportion of episodes are visit(s) only. Given that these services were reimbursed by Medicare, patients must have had a complaint or symptom of eye disease or injury and some of these visits were likely to include a diagnostic service which was not separately billed.

Table 3-9: Total Allowed Charges for Vision Care Episodes^a by Type of Service Provided, 1990

	<u>Percent Distribution Of Episodes</u>	<u>Percent Distribution of Total Allowed Charges</u>
<u>All Episodes</u>	100.0% (N=914,325)	100.0% (\$169,768,656)
Episodes with visit claim(s) only	66.7	14.3
Episodes with visit and diagnostic claim(s) only	13.6	8.8
Episodes with visit and surgery claim(s) only	2.9	11.4
Episodes with visit, diagnostic, and surgery claims only	2.2	18.3
Other ^b	14.6	47.3

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers. Excludes episodes with claim(s) for medical supplies.

^b Consists of "stand-alone" procedures, i.e., episodes with no medical visit.

Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

Received of the Treasurer of the University of Cambridge
 the sum of £ 100 00
 for the purchase of books
 the 10th day of May 1841

Name of the Donor	Amount	Remarks
The Rev. Mr. [Name]	£ 50 00	For the purchase of books
The Rev. Mr. [Name]	£ 25 00	For the purchase of books
The Rev. Mr. [Name]	£ 25 00	For the purchase of books
The Rev. Mr. [Name]	£ 10 00	For the purchase of books
The Rev. Mr. [Name]	£ 10 00	For the purchase of books
The Rev. Mr. [Name]	£ 10 00	For the purchase of books
The Rev. Mr. [Name]	£ 10 00	For the purchase of books
The Rev. Mr. [Name]	£ 10 00	For the purchase of books
The Rev. Mr. [Name]	£ 10 00	For the purchase of books

Total sum received £ 100 00
 The sum of £ 100 00 being the sum of money
 which has been received from the donors
 for the purchase of books
 the 10th day of May 1841

Table 3-10: Characteristics of Vision Care Episodes^a by Type of Service Provided, 1990

	<u>Number of Episodes</u>	<u>Average Allowed Charges</u>	<u>Average No. Days</u>	<u>Average No. Claims</u>
Episodes with visit claim(s) only	610,022	\$40	1.8	1.1
Episodes with visit and diagnostic claim(s) only	124,055	\$121	4.6	2.6
Episodes with visit and surgery claim(s) only	26,231	\$735	10.7	2.7
Episodes with visit, diagnostic, and surgery claims only	20,361	\$1,525	16.2	4.6
Other ^b	133,656	\$600	2.7	1.9

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers. Excludes episodes with claim(s) for medical supplies.

^b Consists of "stand-alone" procedures, i.e., episodes with no medical visit.

Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

period of several weeks, allowing time for an initial visit, diagnostic testing, and surgery. The average number of claims per episode ranged from 1.1 for visit-only episodes to 4.6 for those with a broader range of services.

Place of Service and Provider Specialty. The distribution of the different types of episodes by place of service is presented in Table 3-11. For those episodes which occurred in a physician's office, 72.7 percent included a visit only. In contrast, visit-only episodes accounted for only 13.8 percent of outpatient hospital episodes and less than one percent of ASC episodes. Episodes involving no visits constituted 83 percent of outpatient hospital episodes and 98.5 percent of episodes in an ASC. Almost two-thirds of episodes which took place in more than one site of care involved both visit and surgery claims.

The type of services delivered in an episode also varies by provider specialty, as seen in Table 3-12. The most striking difference is in the proportion of episodes with visits versus those without. Episodes involving optometry only were most likely to consist of visit claim(s) alone, although ophthalmologists also provided a majority of visit-only episodes. Episodes with claims from other provider specialties or more than one provider specialty were most likely, in contrast, to include no visit.

Beneficiary Characteristics. Tables 3-13 through 3-16 present the distribution of episodes by type of service and beneficiary characteristics. While differences appear small relative to those shown by specialty and place of service, there are differences that are statistically significant. In terms of region, the proportion of episodes consisting of visit and diagnostic services only is higher in the Northeast than in other regions and the proportion of episodes with a claim for surgical services is lower there. Some racial differences are also apparent in Table 3-14. As noted earlier in the report, average allowed charges were higher for blacks than for whites; here, 67 percent of episodes for

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Table 3-11: Percent Distribution of Vision Care Episodes^a by Place of Service and Type of Service Provided, 1990

	<u>All</u>	<u>Place of Service</u>			<u>More Than One Site</u>
		<u>Physician Office</u>	<u>Outpatient Hospital</u>	<u>Amb. Surg. Center</u>	
<u>All Episodes</u>	914,325	832,692	31,615	7,274	42,277
Episodes with visit claim(s) only	66.7	72.7	13.8	0.6	0.9
Episodes with visit and diagnostic claim(s) only	13.6	14.7	1.7	0.0	2.7
Episodes with visit and surgery claim(s) only	2.9	1.5	1.1	0.9	31.1
Episodes with visit, diagnostic, and surgery claims only	2.2	0.7	0.2	0.0	35.0
Other ^b	14.6	10.5	83.2	98.5	30.3

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.

^b Consists of "stand-alone" procedures, i.e., episodes with no medical visit.

Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

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BLACK	JOHN	DAVID	J. D.	1925	CHICAGO, ILL.
GRAY	MARY	ELIZABETH	M. E.	1930	CHICAGO, ILL.
WATSON	ROBERT	JOHN	R. J.	1935	CHICAGO, ILL.
ANDERSON	ELIZABETH	MARY	E. M.	1940	CHICAGO, ILL.
THOMAS	WILLIAM	FRANK	W. F.	1945	CHICAGO, ILL.
LEE	CHARLES	ALFRED	C. A.	1950	CHICAGO, ILL.
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YOUNG	JOHN	DAVID	J. D.	1960	CHICAGO, ILL.
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BLACK	MARY	ELIZABETH	M. E.	2000	CHICAGO, ILL.
GRAY	ROBERT	JOHN	R. J.	2005	CHICAGO, ILL.
WATSON	ELIZABETH	MARY	E. M.	2010	CHICAGO, ILL.
ANDERSON	WILLIAM	FRANK	W. F.	2015	CHICAGO, ILL.
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LEE	HELEN	MARY	H. M.	2025	CHICAGO, ILL.
WALKER	JOHN	DAVID	J. D.	2030	CHICAGO, ILL.
YOUNG	MARY	ELIZABETH	M. E.	2035	CHICAGO, ILL.
OLD	ROBERT	JOHN	R. J.	2040	CHICAGO, ILL.
NEWMAN	ELIZABETH	MARY	E. M.	2045	CHICAGO, ILL.
KELLY	WILLIAM	FRANK	W. F.	2050	CHICAGO, ILL.
WRIGHT	CHARLES	ALFRED	C. A.	2055	CHICAGO, ILL.
SCOTT	HELEN	MARY	H. M.	2060	CHICAGO, ILL.
GREEN	JOHN	DAVID	J. D.	2065	CHICAGO, ILL.
WHITE	MARY	ELIZABETH	M. E.	2070	CHICAGO, ILL.
BLACK	ROBERT	JOHN	R. J.	2075	CHICAGO, ILL.
GRAY	ELIZABETH	MARY	E. M.	2080	CHICAGO, ILL.
WATSON	WILLIAM	FRANK	W. F.	2085	CHICAGO, ILL.
ANDERSON	CHARLES	ALFRED	C. A.	2090	CHICAGO, ILL.
THOMAS	HELEN	MARY	H. M.	2095	CHICAGO, ILL.
LEE	JOHN	DAVID	J. D.	2100	CHICAGO, ILL.
WALKER	MARY	ELIZABETH	M. E.	2105	CHICAGO, ILL.
YOUNG	ROBERT	JOHN	R. J.	2110	CHICAGO, ILL.
OLD	ELIZABETH	MARY	E. M.	2115	CHICAGO, ILL.
NEWMAN	WILLIAM	FRANK	W. F.	2120	CHICAGO, ILL.
KELLY	CHARLES	ALFRED	C. A.	2125	CHICAGO, ILL.
WRIGHT	HELEN	MARY	H. M.	2130	CHICAGO, ILL.
SCOTT	JOHN	DAVID	J. D.	2135	CHICAGO, ILL.
GREEN	MARY	ELIZABETH	M. E.	2140	CHICAGO, ILL.
WHITE	ROBERT	JOHN	R. J.	2145	CHICAGO, ILL.
BLACK	ELIZABETH	MARY	E. M.	2150	CHICAGO, ILL.
GRAY	WILLIAM	FRANK	W. F.	2155	CHICAGO, ILL.
WATSON	CHARLES	ALFRED	C. A.	2160	CHICAGO, ILL.
ANDERSON	HELEN	MARY	H. M.	2165	CHICAGO, ILL.
THOMAS	JOHN	DAVID	J. D.	2170	CHICAGO, ILL.
LEE	MARY	ELIZABETH	M. E.	2175	CHICAGO, ILL.
WALKER	ROBERT	JOHN	R. J.	2180	CHICAGO, ILL.
YOUNG	ELIZABETH	MARY	E. M.	2185	CHICAGO, ILL.
OLD	WILLIAM	FRANK	W. F.	2190	CHICAGO, ILL.
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GREEN	ROBERT	JOHN	R. J.	2215	CHICAGO, ILL.
WHITE	ELIZABETH	MARY	E. M.	2220	CHICAGO, ILL.
BLACK	WILLIAM	FRANK	W. F.	2225	CHICAGO, ILL.
GRAY	CHARLES	ALFRED	C. A.	2230	CHICAGO, ILL.
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OLD	CHARLES	ALFRED	C. A.	2265	CHICAGO, ILL.
NEWMAN	HELEN	MARY	H. M.	2270	CHICAGO, ILL.
KELLY	JOHN	DAVID	J. D.	2275	CHICAGO, ILL.
WRIGHT	MARY	ELIZABETH	M. E.	2280	CHICAGO, ILL.
SCOTT	ROBERT	JOHN	R. J.	2285	CHICAGO, ILL.
GREEN	ELIZABETH	MARY	E. M.	2290	CHICAGO, ILL.
WHITE	WILLIAM	FRANK	W. F.	2295	CHICAGO, ILL.
BLACK	CHARLES	ALFRED	C. A.	2300	CHICAGO, ILL.
GRAY	HELEN	MARY	H. M.	2305	CHICAGO, ILL.
WATSON	JOHN	DAVID	J. D.	2310	CHICAGO, ILL.
ANDERSON	MARY	ELIZABETH	M. E.	2315	CHICAGO, ILL.
THOMAS	ROBERT	JOHN	R. J.	2320	CHICAGO, ILL.
LEE	ELIZABETH	MARY	E. M.	2325	CHICAGO, ILL.
WALKER	WILLIAM	FRANK	W. F.	2330	CHICAGO, ILL.
YOUNG	CHARLES	ALFRED	C. A.	2335	CHICAGO, ILL.
OLD	HELEN	MARY	H. M.	2340	CHICAGO, ILL.
NEWMAN	JOHN	DAVID	J. D.	2345	CHICAGO, ILL.
KELLY	MARY	ELIZABETH	M. E.	2350	CHICAGO, ILL.
WRIGHT	ROBERT	JOHN	R. J.	2355	CHICAGO, ILL.
SCOTT	ELIZABETH	MARY	E. M.	2360	CHICAGO, ILL.
GREEN	WILLIAM	FRANK	W. F.	2365	CHICAGO, ILL.
WHITE	CHARLES	ALFRED	C. A.	2370	CHICAGO, ILL.
BLACK	HELEN	MARY	H. M.	2375	CHICAGO, ILL.
GRAY	JOHN	DAVID	J. D.	2380	CHICAGO, ILL.
WATSON	MARY	ELIZABETH	M. E.	2385	CHICAGO, ILL.
ANDERSON	ROBERT	JOHN	R. J.	2390	CHICAGO, ILL.
THOMAS	ELIZABETH	MARY	E. M.	2395	CHICAGO, ILL.
LEE	WILLIAM	FRANK	W. F.	2400	CHICAGO, ILL.
WALKER	CHARLES	ALFRED	C. A.	2405	CHICAGO, ILL.
YOUNG	HELEN	MARY	H. M.	2410	CHICAGO, ILL.
OLD	JOHN	DAVID	J. D.	2415	CHICAGO, ILL.
NEWMAN	MARY	ELIZABETH	M. E.	2420	CHICAGO, ILL.
KELLY	ROBERT	JOHN	R. J.	2425	CHICAGO, ILL.
WRIGHT	ELIZABETH	MARY	E. M.	2430	CHICAGO, ILL.
SCOTT	WILLIAM	FRANK	W. F.	2435	CHICAGO, ILL.
GREEN	CHARLES	ALFRED	C. A.	2440	CHICAGO, ILL.
WHITE	HELEN	MARY	H. M.	2445	CHICAGO, ILL.
BLACK	JOHN	DAVID	J. D.	2450	CHICAGO, ILL.
GRAY	MARY	ELIZABETH	M. E.	2455	CHICAGO, ILL.
WATSON	ROBERT	JOHN	R. J.	2460	CHICAGO, ILL.
ANDERSON	ELIZABETH	MARY	E. M.	2465	CHICAGO, ILL.
THOMAS	WILLIAM	FRANK	W. F.	2470	CHICAGO, ILL.
LEE	CHARLES	ALFRED	C. A.	2475	CHICAGO, ILL.
WALKER	HELEN	MARY	H. M.	2480	CHICAGO, ILL.
YOUNG	JOHN	DAVID	J. D.	2485	CHICAGO, ILL.
OLD	MARY	ELIZABETH	M. E.	2490	CHICAGO, ILL.
NEWMAN	ROBERT	JOHN	R. J.	2495	CHICAGO, ILL.
KELLY	ELIZABETH	MARY	E. M.	2500	CHICAGO, ILL.
WRIGHT	WILLIAM	FRANK	W. F.	2505	CHICAGO, ILL.
SCOTT	CHARLES	ALFRED	C. A.	2510	CHICAGO, ILL.
GREEN	HELEN	MARY	H. M.	2515	CHICAGO, ILL.
WHITE	JOHN	DAVID	J. D.	2520	CHICAGO, ILL.
BLACK	MARY	ELIZABETH	M. E.	2525	CHICAGO, ILL.
GRAY	ROBERT	JOHN	R. J.	2530	CHICAGO, ILL.
WATSON	ELIZABETH	MARY	E. M.	2535	CHICAGO, ILL.
ANDERSON	WILLIAM	FRANK	W. F.	2540	CHICAGO, ILL.
THOMAS	CHARLES	ALFRED	C. A.	2545	CHICAGO, ILL.
LEE	HELEN	MARY	H. M.	2550	CHICAGO, ILL.
WALKER	JOHN	DAVID	J. D.	2555	CHICAGO, ILL.
YOUNG	MARY	ELIZABETH	M. E.	2560	CHICAGO, ILL.
OLD	ROBERT	JOHN	R. J.	2565	CHICAGO, ILL.
NEWMAN	ELIZABETH	MARY	E. M.	2570	CHICAGO, ILL.
KELLY	WILLIAM	FRANK	W. F.	2575	CHICAGO, ILL.
WRIGHT	CHARLES	ALFRED	C. A.	2580	CHICAGO, ILL.
SCOTT	HELEN	MARY	H. M.	2585	CHICAGO, ILL.
GREEN	JOHN	DAVID	J. D.	2590	CHICAGO, ILL.
WHITE	MARY	ELIZABETH	M. E.	2595	CHICAGO, ILL.
BLACK	ROBERT	JOHN	R. J.	2600	CHICAGO, ILL.
GRAY	ELIZABETH	MARY	E. M.	2605	CHICAGO, ILL.
WATSON	WILLIAM	FRANK	W. F.	2610	CHICAGO, ILL.
ANDERSON	CHARLES	ALFRED	C. A.	2615	CHICAGO, ILL.
THOMAS	HELEN	MARY	H. M.	2620	CHICAGO, ILL.
LEE	JOHN	DAVID	J. D.	2625	CHICAGO, ILL.
WALKER	MARY	ELIZABETH	M. E.	2630	CHICAGO, ILL.
YOUNG	ROBERT	JOHN	R. J.	2635	CHICAGO, ILL.
OLD	ELIZABETH	MARY	E. M.	2640	CHICAGO, ILL.
NEWMAN	WILLIAM	FRANK	W. F.	2645	CHICAGO, ILL.
KELLY	CHARLES	ALFRED	C. A.	2650	CHICAGO, ILL.
WRIGHT	HELEN	MARY	H. M.	2655	CHICAGO, ILL.
SCOTT	JOHN	DAVID	J. D.	2660	CHICAGO, ILL.
GREEN	MARY	ELIZABETH	M. E.	2665	CHICAGO, ILL.
WHITE	ROBERT	JOHN	R. J.	2670	CHICAGO, ILL.
BLACK	ELIZABETH	MARY	E. M.	2675	CHICAGO, ILL.
GRAY	WILLIAM	FRANK	W. F.	2680	CHICAGO, ILL.
WATSON	CHARLES	ALFRED	C. A.	2685	CHICAGO, ILL.
ANDERSON	HELEN	MARY	H. M.	2690	CHICAGO, ILL.
THOMAS	JOHN	DAVID	J. D.	2695	CHICAGO, ILL.
LEE	MARY	ELIZABETH	M. E.	2700	CHICAGO, ILL.
WALKER	ROBERT	JOHN	R. J.	2705	CHICAGO, ILL.
YOUNG	ELIZABETH	MARY	E. M.	2710	CHICAGO, ILL.
OLD	WILLIAM	FRANK	W. F.	2715	CHICAGO, ILL.
NEWMAN	CHARLES	ALFRED	C. A.	2720	CHICAGO, ILL.
KELLY	HELEN	MARY	H. M.	2725	CHICAGO, ILL.
WRIGHT	JOHN	DAVID	J. D.	2730	CHICAGO, ILL.
SCOTT	MARY	ELIZABETH	M. E.	2735	CHICAGO, ILL.
GREEN	ROBERT	JOHN	R. J.	2740	CHICAGO, ILL.
WHITE	ELIZABETH	MARY	E. M.	2745	CHICAGO, ILL.
BLACK	WILLIAM	FRANK	W. F.	2750	CHICAGO, ILL.
GRAY	CHARLES	ALFRED	C. A.	2755	CHICAGO, ILL.
WATSON	HELEN	MARY	H. M.	2760	CHICAGO, ILL.
ANDERSON	JOHN	DAVID	J. D.	2765	CHICAGO, ILL.
THOMAS	MARY	ELIZABETH	M. E.	2770	CHICAGO, ILL.
LEE	ROBERT	JOHN	R. J.	2775	CHICAGO, ILL.
WALKER	ELIZABETH	MARY	E. M.	2780	CHICAGO, ILL.
YOUNG	WILLIAM	FRANK	W. F.	2785	CHICAGO, ILL.
OLD	CHARLES	ALFRED	C. A.	2790	CHICAGO, ILL.
NEWMAN	HELEN	MARY	H. M.	2795	CHICAGO, ILL.
KELLY	JOHN	DAVID	J. D.	2800	CHICAGO, ILL.
WRIGHT	MARY	ELIZABETH	M. E.	2805	CHICAGO, ILL.
SCOTT	ROBERT	JOHN	R. J.	2810	CHICAGO, ILL.
GREEN	ELIZABETH	MARY	E. M.	2815	CHICAGO, ILL.
WHITE	WILLIAM	FRANK	W. F.	2820	CHICAGO, ILL.
BLACK	CHARLES	ALFRED	C. A.	2825	CHICAGO, ILL.
GRAY	HELEN	MARY	H. M.	2830	CHICAGO, ILL.
WATSON	JOHN	DAVID	J. D.	2835	CHICAGO, ILL.
ANDERSON	MARY	ELIZABETH	M. E.	2840	CHICAGO, ILL.
THOMAS	ROBERT	JOHN	R. J.	2845	CHICAGO, ILL.
LEE	ELIZABETH	MARY	E. M.	2850	CHICAGO, ILL.
WALKER	WILLIAM	FRANK	W. F.	2855	CHICAGO, ILL.
YOUNG	CHARLES	ALFRED	C. A.	2860	CHICAGO, ILL.
OLD	HELEN	MARY	H. M.	2865	CHICAGO, ILL.
NEWMAN	JOHN	DAVID	J. D.	2870	CHICAGO, ILL.
KELLY	MARY	ELIZABETH	M. E.	2875	CHICAGO, ILL.
WRIGHT	ROBERT	JOHN	R. J.	2880	CHICAGO, ILL.
SCOTT	ELIZABETH	MARY	E. M.	2885	CHICAGO, ILL.
GREEN	WILLIAM	FRANK	W. F.	2890	CHICAGO, ILL.
WHITE	CHARLES	ALFRED	C. A.	2895	CHICAGO, ILL.
BLACK	HELEN	MARY	H. M.	2900	CHICAGO, ILL.
GRAY	JOHN	DAVID	J. D.	2905	CHICAGO, ILL.
WATSON	MARY	ELIZABETH	M. E.	2910	CHICAGO, ILL.
ANDERSON	ROBERT	JOHN	R. J.	2915	CHICAGO, ILL.
THOMAS	ELIZABETH	MARY	E. M.	2920	CHICAGO, ILL.
LEE	WILLIAM	FRANK	W. F.	2925	CHICAGO, ILL.
WALKER	CHARLES	ALFRED	C. A.	2930	CHICAGO, ILL.
YOUNG	HELEN	MARY	H. M.	2935	CHICAGO, ILL.
OLD	JOHN	DAVID	J. D.	2940	CHICAGO, ILL.
NEWMAN	MARY	ELIZABETH	M. E.	2945	CHICAGO, ILL.
KELLY	ROBERT	JOHN	R. J.	2950	CHICAGO, ILL.
WRIGHT	ELIZABETH	MARY	E. M.	2955	CHICAGO, ILL.
SCOTT	WILLIAM	FRANK	W. F.	2960	CHICAGO, ILL.
GREEN	CHARLES	ALFRED	C. A.	2965	CHICAGO, ILL.
WHITE	HELEN	MARY	H. M.	2970	CHICAGO, ILL.
BLACK	JOHN	DAVID	J. D.	2975	CHICAGO, ILL.
GRAY	MARY	ELIZABETH	M. E.	2980	CHICAGO, ILL.
WATSON	ROBERT	JOHN	R. J.	2985	CHICAGO, ILL.
ANDERSON	ELIZABETH	MARY	E. M.	2990	CHICAGO, ILL.
THOMAS	WILLIAM	FRANK	W. F.	2995	CHICAGO, ILL.
LEE	CHARLES	ALFRED	C		

Table 3-12: Percent Distribution of Vision Care Episodes^a by Provider Specialty and Type of Service Provided, 1990

	<u>All</u>	<u>Ophthalmology Only</u>	<u>Optometry Only</u>	<u>Other Only</u>	<u>More Than One Specialty</u>
<u>All Episodes</u>	914,325	753,827	105,736	23,970	30,792
Episodes with visit claim(s) only	66.7	67.7	77.3	47.5	20.3
Episodes with visit and diagnostic claim(s) only	13.6	13.2	16.3	8.3	18.4
Episodes with visit and surgery claim(s) only	2.9	2.8	0.4	1.7	14.1
Episodes with visit, diagnostic, and surgery claims only	2.2	2.1	0.1	1.4	13.4
Other	14.6	14.2	5.9	41.1	33.8

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers. Excludes episodes with claim(s) for medical supplies.

Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

Table 3-13: Percent Distribution of Vision Care Episodes^a by Region and Type of Service Provided, 1990

	<u>All</u>	<u>Northeast</u>	<u>Midwest</u>	<u>South</u>	<u>West</u>
<u>All Episodes</u>	901,716 ^b	221,798	210,388	318,282	144,756
Episodes with visit claim(s) only	66.7	65.4	66.1	67.3	68.1
Episodes with visit and diagnostic claim(s) only	13.6	17.1	13.3	12.3	11.6
Episodes with visit and surgery claim(s) only	2.9	2.3	2.8	3.3	2.9
Episodes with visit, diagnostic, and surgery claims only	2.2	1.8	2.4	2.6	1.8
Other ^b	14.6	13.4	15.4	14.6	15.6

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers. Excludes episodes with claim(s) for medical supplies.

^b Some episodes have missing region identifiers or are not linked to one of 4 U.S. Census regions.

Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

Table 3-14: Percent Distribution of Vision Care Episodes^a by Beneficiary Race, 1990

	<u>White</u>	<u>Black</u>	<u>Other</u>
<u>All Episodes</u>	806,815	59,903	17,905
Episodes with visit claim(s) only	67.1	62.8	64.0
Episodes with visit and diagnostic claim(s) only	13.3	16.5	14.8
Episodes with visit and surgery claim(s) only	2.9	2.8	3.7
Episodes with visit, diagnostic, and surgery claims only	2.2	2.8	2.6
Other	14.6	15.0	14.9

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers. Excludes episodes with claim(s) for medical supplies.
Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

whites are visits only compared to 63 percent for blacks while blacks are more likely to have episodes with a visit and separately-billed diagnostic service (16.5% for blacks vs. 13.3% for whites). There is little variation in the distribution of episodes between males and females (Table 3-15) or by age (Table 3-16).

3.3 Use of Diagnostic Vision Care Services

While much attention has been focused on the large expenditures associated with surgical services, there has been less emphasis on the high volume medical visits and accompanying diagnostic services. The next two sections provide a more indepth look at those episodes of use in which visits and/or diagnostic services are delivered.

As described earlier, diagnostic services account for approximately 9 percent of dollars spent on ambulatory vision care services, but about 18 percent of the volume of services (measured in number of claims). Of the 991,369 episodes examined in this report, 215,021 or 22 percent include at least one claim for a diagnostic service.

These diagnostic services encompass over 30 CPT codes and include such services as ophthalmoscopy, visual field exams, and ophthalmic ultrasound.⁵ Table 3-17 shows a more detailed breakdown of the use of these services. Seventy percent of episodes included only one diagnostic claim. Of these, almost half of the episodes included a claim for a visual field exam or other diagnostic maneuver. Only 21 percent of episodes with one claim only included a claim for an ophthalmic ultrasound.

⁵ An ophthalmoscopy is an examination of the interior of the eyeball through the pupil by means of a device called an ophthalmoscope. A visual field exam is a medical diagnostic evaluation, involving measurement of the area simultaneously visible to one eye without movement. An ophthalmic ultrasound is a test which uses high frequency energy waves to obtain images of the eye for medical diagnostic purposes.

Table 3-15: Percent Distribution of Vision Care Episodes^a by Beneficiary Sex, 1990

	<u>Male</u>	<u>Female</u>
<u>All Episodes</u>	310,398	588,326
Episodes with visit claim(s) only	66.4	66.8
Episodes with visit and diagnostic claim(s) only	14.0	13.4
Episodes with visit and surgery claim(s) only	2.8	2.9
Episodes with visit, diagnostic, and surgery claims only	2.3	2.2
Other	14.7	14.7

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers. Excludes episodes with claim(s) for medical supplies. Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

Table 3-16: Percent Distribution of Vision Care Episodes^a by Beneficiary Age, 1990

	<u>Age</u>		
	<u>Less than 65</u>	<u>65 to 74</u>	<u>75 and over</u>
<u>All Episodes</u>			
Episodes with visit claim(s) only	66.3	67.5	66.0
Episodes with visit and diagnostic claim(s) only	14.3	14.2	13.0
Episodes with visit and surgery claim(s) only	2.7	2.5	3.2
Episodes with visit, diagnostic, and surgery claims only	2.1	2.1	2.4
Other	14.6	13.8	15.4

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers. Excludes episodes with claim(s) for medical supplies. Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

Table 3-17: Vision Care Episodes^a with One or More Diagnostic Claims^b: Frequency and Average Allowed Charges by Subfamily

		<u>Average Allowed Charge Per Episode</u>	
		All Claims	Diagnostic Claims Only
<u>All Episodes</u>	215,021	\$340	\$81
With one diagnostic claim			
Ophthalmoscopy, extended	13.2%	\$121	\$37
Ophthalmoscopy, with angioscopy	7.0%	\$194	\$70
Other diagnostic services	3.9%	\$161	\$25
Visual field exam	23.4%	\$114	\$54
Other diagnostic maneuvers	9.6%	\$125	\$35
Ophthalmic ultrasound	15.1%	\$793	\$81
With more than one diagnostic claim	27.7%	\$525	\$153

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.

^b Diagnostic claims refer to Families 4, 5, and 6.

Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

Average allowed charges per episode were \$340 for episodes with at least one diagnostic claim, about 80 percent higher than for episodes as a whole. These charges varied depending upon the type of diagnostic services included. The highest average allowed charge (\$793) was for episodes with an ophthalmic ultrasound; the lowest (\$114) was for episodes with a visual field exam.

Only \$81 (24%), on average, was attributable to the diagnostic claims themselves, suggesting that these episodes are more likely to include a surgical procedure as well. This is particularly apparent for ophthalmic ultrasound, where diagnostic charges are only 10 percent of total charges for the episode.

In terms of place of service, episodes with one or more diagnostic claim were concentrated in physicians' offices as were episodes as a whole (see Table 3-18). Eighty-seven percent of diagnostic episodes were billed from a physician's office, with only 1 percent in an outpatient hospital setting, and no episodes occurring in an ASC. These episodes were substantially more likely than episodes as a whole to take place at more than one site (12.5% of diagnostic episodes compared to 6% overall).

For the vision care subfamilies, there is little variation by place of service, with the exceptions of episodes with ophthalmic ultrasound and episodes with more than one diagnostic claim. Only 58.5 percent of episodes with ophthalmic ultrasounds occur in a physician's office, while 40 percent include more than one place of service, probably because physicians do not have the necessary equipment in their offices.

The distribution of diagnostic episodes by provider specialty is quite skewed though similar to that for all episodes (see Table 3-19). Seventy-eight percent of these episode are billed by an ophthalmologist(s) only, 10.5 percent by an optometrist(s) only,

**Table 3-18: Vision Care Episodes^a with One or More Diagnostic Claims:
Percent Distribution by Place of Service and Subfamily**

	Physician Office	Outpatient Hospital	Ambulatory Surgery Center	More Than One Place of Service
	Percent Distribution			
<u>All Episodes</u>	86.5	1.0	0.0	12.5
With one diagnostic claim				
Ophthalmoscopy, extended	96.3	0.5	0.0	3.2
Ophthalmoscopy, with angioscopy	91.8	2.5	0.0	5.6
Other diagnostic services	94.2	0.5	0.0	5.3
Visual field exam	96.7	0.9	0.0	2.4
Other diagnostic maneuvers	93.6	1.1	0.0	5.3
Ophthalmic ultrasound	58.5	1.5	0.1	40.0
With more than one diagnostic claim	83.6	0.6	0.0	15.8

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.
Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

**Table 3-19: Vision Care Episodes^a with One or More Diagnostic Claims:
Percent Distribution by Provider Specialty and Subfamily**

	Ophthal- mologist Only	Optometrist Only	Other Specialty Only	More Than One Specialty
	Percent Distribution			
<u>All Episodes</u>	78.3	10.5	3.1	8.1
With one diagnostic claim				
Ophthalmoscopy, extended	78.4	15.5	1.3	4.9
Ophthalmoscopy, with angioscopy	73.5	17.5	3.7	5.3
Other diagnostic services	89.6	2.9	3.1	4.4
Visual field exam	81.8	11.1	3.5	3.6
Other diagnostic maneuvers	70.5	16.1	8.1	5.3
Ophthalmic ultrasound	81.9	0.4	3.5	14.2
With more than one diagnostic claim	75.6	10.6	1.6	12.2

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.

Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

and 8.1 percent include claims from more than one specialty. Only three percent of episodes are billed by another provider specialty.

At the subfamily level, ophthalmologists remain the sole provider in the majority of episodes but there is some variation. For episodes including diagnostic services other than ophthalmoscopy, 90 percent involve an ophthalmologist only. Optometrists account for over 15 percent of episodes for three of the subfamilies: ophthalmoscopy, extended and with angioscopy, and diagnostic maneuvers other than a visual field exam. Over ten percent of episodes with an ophthalmic ultrasound or with more than one diagnostic claim are billed by providers from more than one specialty.

Table 3-20 presents information on other services provided along with the diagnostic services described above. For the episodes with one or more diagnostic claims, 15 percent also included a claim for surgery. As suggested earlier, surgery claims were most likely to be found in episodes with an ophthalmic ultrasound (41.4%) and in episodes with more than one diagnostic claim (20.7%).

Fifty-five percent of episodes with a diagnostic claim included a bill for one of the specially-coded ophthalmology visits. One-quarter of diagnostic episodes were delivered without a visit; this proportion was over one-half for diagnostic maneuvers other than a visual field exam. Only 3.1 percent of diagnostic episodes included a medical supply claim.

3.4 Use of Visits

Approximately 85 percent of vision care episodes included at least one claim for a medical visit. As shown in Table 3-21, the most frequent type of visit was one of the specially-coded ophthalmological visits; these accounted for 63.5 percent of all episodes

Table 3-20: Vision Care Episodes^a with One or More Diagnostic Claims^b: Percent with Surgery, Visit, or Medical Supply by Subfamily

	Percent With Surgery ^c	Percent With Ophthalmologic Visit ^d	Percent With No Visit ^e	Percent with Medical Supply ^f
All Episodes	15.0	54.7	25.0	3.1
With one diagnostic claim				
Ophthalmoscopy, extended	5.3	62.0	24.2	3.5
Ophthalmoscopy, with angioscopy	9.5	60.8	20.3	2.7
Other diagnostic services	10.1	66.6	8.8	1.9
Visual field exam	2.9	51.1	20.4	2.2
Other diagnostic maneuvers	6.1	29.9	51.2	4.1
Ophthalmic ultrasound	41.4	50.7	32.6	3.6
With more than one diagnostic claim	20.7	61.7	19.7	3.4

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.

^b Diagnostic claims refer to Families 4, 5 and 6.

^c Includes one or more claims from Families 9-16.

^d Includes one or more claims from Family 3.

^e Includes no claims from Families 1-3.

^f Includes one or more claims from Family 17.

Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

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Table 3-21: Vision Care Episodes^a with One or More Visits: Frequency and Average Allowed Charge by Subfamily

	Number of Episodes	<u>Average Charge per Episode</u>	
		All Claims	Visit Claims Only
<u>All Episodes</u>	846,953	\$135	\$43
One visit claim only			
Office medical services, new patient, any level	1.1%	\$118	\$39
Office medical services, established patient, minimal, brief, or limited	16.2%	\$82	\$23
Office medical services, established patient, intermediate, extended, or comprehensive	6.8%	\$120	\$35
Initial or follow-up consultation	1.3%	\$282	\$81
Ophthalmological services, new patient	10.7%	\$138	\$43
Ophthalmological services, established patient	52.8%	\$101	\$39
More than one visit claim	10.9%	\$370	\$89

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.
Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

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with visits. Only a small proportion of visit episodes -- 10.9 percent -- involved more than one visit.

The average allowed charge per episode with a visit was \$135, lower than the \$191 for visits overall. Episode-level charges were substantially higher for episodes including a consultation (\$282) and for episodes with more than one visit claim (\$370). On average, visit claims accounted for approximately 30 percent of total episode charges. An ophthalmologic visit for an established patient accounted for a somewhat higher proportion of episode charges, while visit claims for episodes with more than one visit represented a somewhat lower proportion.

As can be seen in Table 3-22, the distribution of episodes with visits across the sites of care is similar by type of visit. Overall, 93 percent of these episodes occurred in physicians' offices. Only episodes with a consultation and episodes with more than one visit are somewhat less likely to be billed from an office setting -- 87 and 85 percent, respectively. Four percent of consultations took place in an outpatient hospital setting and 9 percent in more than one place of service. Fifteen percent of episodes with multiple visits were billed from more than one site.

Table 3-23 presents the distribution of episodes with visits by provider specialty. Overall, 79 percent of visit episodes involved an ophthalmologist only. This is only slightly higher than for all episodes (77%). For episodes as a whole, 4 percent were billed by nonvision specialists, compared to 1.8 percent for episodes involving visits.

In terms of the distributions for subfamilies, consultations and all levels of regular visits for established patients were more likely to involve an ophthalmologist. Optometrists accounted for the highest proportion of episodes with visits for new

Table 3-22: Vision Care Episodes^a with One or More Visits: Percent Distribution by Place of Service and Subfamily

	Physician Office	Outpatient Hospital	Ambulatory Surgery Center	More Than One Place
	Percent Distribution			
<u>All Episodes</u>	93.4	0.6	0.0	6.0
One visit claim only				
Office medical services, new patient, any level	94.2	0.7	0.0	5.1
Office medical services, established patient, minimal, brief, or limited	94.7	0.8	0.0	4.5
Office medical services, established patient, intermediate, extended, or comprehensive	93.5	0.7	0.0	5.8
Initial or follow-up consultation	87.4	3.8	0.0	8.6
Ophthalmological services, new patient	93.6	0.9	0.0	5.4
Ophthalmological services, established patient	94.9	0.5	0.0	4.6
More than one visit claim	84.5	0.5	0.0	15.0

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.
Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

Table 3-23: Vision Care Episodes^a with One or More Visits: Percent Distribution by Provider Specialty and Subfamily

	Ophthalmologist Only	Optometrist Only	Other Specialty Only	More Than One Specialty
	Percent Distribution			
<u>All Episodes</u>	79.3	13.5	1.8	5.5
One visit claim only				
Office medical services, new patient, any level	75.1	21.7	0.6	2.7
Office medical services, established patient, minimal, brief, or limited	88.2	8.4	0.3	3.1
Office medical services, established patient, intermediate, extended, or comprehensive	84.6	10.6	0.6	4.2
Initial or follow-up consultation	91.9	3.4	0.5	4.2
Ophthalmological services, new patient	70.2	24.1	2.8	2.9
Ophthalmological services, established patient	79.3	14.8	2.4	3.6
More than one visit claim	70.3	6.6	0.9	22.2

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.
Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

patients, indicating that they may serve as the initial point of contact for persons seeking vision care services.

Other vision care services provided along with visits are shown in Table 3-24. Surgical procedures were not frequently billed in the same episodes as visits, with only 6.8 percent of these episodes including a surgery claim. In 1990, many surgeries, depending on the locality, would have been billed using a global code which is essentially a flat fee incorporating all surgery-related services. Thus, most visits delivered in conjunction with surgery would not be separately billed and any visit claims which we observe are likely to be in addition to those included in the global surgical package. Nineteen percent of episodes included a diagnostic claim and 5 percent had a claim for a medical supply. Episodes with consultations and episodes with more than one visit claim were most likely to also include surgical or diagnostic procedures.

3.5 Use of Medical Supplies

As shown in Table 3-25, a total of 77,044 of the vision care episodes included a claim for a medical supply. This represents 7.8 percent of episodes. Three specific V-codes account for over half of all medical supplies (tabulations from the BMAD Provider File). These are frames and spectacle lenses (V2020), spherocylinder, bifocal (V2203), and U-V lens (V2755). The average allowed charge for these episodes was \$251, thirty-one percent higher than the average charge for all episodes.

Compared to episodes as a whole, episodes with medical supplies were more likely to include no visit (52.7% vs. 14.6%) and were less likely to include a visit only (38.8% compared to 66.7%). The distribution by provider specialty is also markedly different. Whereas 77 percent of all vision care episodes were billed by an ophthalmologist, only 15.7 of medical supply episodes were billed by this specialty.

Table 3-24: Vision Care Episodes^a with One or More Visits: Percent with Surgery, Diagnostic Service, or Medical Supply by Subfamily

	Percent with Surgery ^b	Percent with Diagnostic Claim ^c	Percent with Medical Supply ^d
	Percent Distribution		
All Episodes	6.8	19.0	5.0
One visit claim only			
Office medical services, new patient, any level	6.6	16.5	3.5
Office medical services, established patient, minimal, brief, or limited	5.5	16.3	3.4
Office medical services, established patient, intermediate, extended, or comprehensive	6.4	15.7	4.6
Initial or follow-up consultation	12.5	40.0	2.2
Ophthalmological services, new patient	5.7	19.8	3.8
Ophthalmological services, established patient	4.7	15.6	5.3
More than one visit claim	19.5	38.8	7.8

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.

^b Includes one or more claims from Families 9-16.

^c Includes one or more claims from Families 4-6.

^d Includes one or more claims from Family 17.

Source: Project HOPE tabulations abased on 1990 BMAD Beneficiary File.

Table 3-25: Vision Care Episodes^a with One or More Claims for Medical Supply

	<u>All Episodes</u>	n = 77,044
	(Percent Distribution)	Average Allowed Charge = \$251
<u>Type of Service</u>		
Visit(s) only	38.8	
Visit(s) and diagnostic services	4.6	
Visit(s) and surgical services	2.4	
Visit(s), diagnostic, and surgical services	1.5	
No visit	52.7	
<u>Provider Specialty</u>		
Ophthalmologist only	15.7	
Optometrist only	30.0	
Other only	21.8	
More than one specialty	32.5	
<u>Place of Service</u>		
Physician office	60.2	
Outpatient hospital	0.0	
Ambulatory surgery center	0.9	
More than one place	22.3	
<u>Region</u>		
Northeast	22.6	
Midwest	26.3	
South	33.8	
West	17.2	

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Excludes claims from episodes with 3 or more providers.

Source: Project HOPE tabulations based on 1990 BMAD Beneficiary File.

Thirty percent of these episodes were billed by optometrists, 21.8 percent by other specialties, and 32.5 percent by providers from more than one specialty.⁶ Episodes with a medical supply included more than one place of service substantially more frequently than episodes as a whole (22.3% compared to 6%). The distribution across regions was similar to that for all episodes.

⁶It should be reiterated that medical supply companies are considered a provider specialty in this database, so that many of the episodes with more than one specialty may include a vision care provider and medical supply company.

4. DELIVERY OF VISION CARE SERVICES BY PROVIDERS

4.1 Overview

This section of the report describes the findings from the analysis of vision care episodes produced from the BMAD Provider File. As described in detail in Section 2, the BMAD Provider File is a 5 percent sample of Medicare providers with all claims for their services delivered under Medicare Part B. The episodes created for analytic purposes include all vision care services delivered by each of these sample providers. Providers are likely to have multiple episodes, both because they deliver care to a number of beneficiaries and because each beneficiary could have more than one episode of care. Each series of vision care services delivered to a beneficiary by the sample providers is represented in the analytic file by an episode. In contrast to the beneficiary-level analysis in Section 3 of this report, however, the provider analysis does not allow examination of more than one provider linked to the same beneficiary. Thus, the unit of analysis in this section is the provider (rather than the beneficiary); these data are most useful for examining variation in the delivery of services across provider types and for providers practicing in different types of geographic areas.

Approximately 5,900 providers delivering vision care services are represented in our analytic file. Twenty-six percent of these providers list their specialty as ophthalmology, 30 percent as optometry, and 16 percent as family or general practice or internal medicine.¹ Almost 7 percent of providers are medical supply companies and 3.4

¹ As was noted in Section 2, a provider may be an individual physician, a multi-specialty group practice or clinic, or a medical supplier. An individual provider may also be double-counted if they use different identification numbers for different practice locations. The distribution described here is that of the number of providers rather than of charges or claims (both of which are highly skewed toward ophthalmologists).

percent are Certified Prosthetists or Orthotists. The number of beneficiaries provided vision care services by a given provider varied considerably by specialty. The median number of unique beneficiaries that obtained care from an ophthalmologist was 54, while optometrists saw an average of 18 patients. Nonvision care specialists, as defined above, provided vision care services to a median of 2 Medicare beneficiaries.

The provision of vision care services has been examined by the same families of services as employed in Section 3 of this report. These families, along with the distribution of total allowed charges and claims, is presented in Tables 4-1 through 4-3 for ophthalmologists, optometrists, and other providers, respectively. These distributions are calculated using the total number of providers (of that specialty) as the denominator so that all providers get equal weight regardless of the amount of their total billings; thus, the figures represent the proportion of vision care revenue (or claims) from each family for the average provider.

Table 4-1 indicates that the distributions of charges and claims are somewhat different for the average ophthalmologist who provides Medicare vision services. Approximately two-thirds of the Medicare vision services provided by the average ophthalmologist are from physician visits (either regular or the specially-coded ophthalmologic visits). These services represent only 36 percent of Medicare vision revenues, however. Separately-billed diagnostic services account for 18 percent of claims and 12 percent of charges. Just over one-third of charges -- but only 6 percent of claims -- by the average ophthalmologist are for lens-related surgery.

In contrast, for the average optometrist providing vision services to Medicare beneficiaries, the distributions of charges and claims are quite similar (see Table 4-2). Slightly over 50 percent of charges and claims are for visits. Medical supplies account for 38 and 35 percent of charges and claims, respectively.

**Table 4-1: Medicare Part B Ambulatory Vision Care Services^a, 1990:
Percentage of Claims and Charges by Vision Care Family for
Ophthalmologists**

<u>Vision Care Family</u>	<u>Percentage of Total Allowed Charges per Provider</u>	<u>Percentage of of Claims per Provider</u>
All Families	100.0%	100.0%
Visits		
Medical visits	9.3	21.3
Consultations	2.4	2.7
Ophthalmologic visits	26.7	45.8
Diagnostic services		
Diagnostic services	4.7	7.6
Diagnostic maneuvers	3.8	6.4
Ophthalmic ultrasound	3.0	3.6
Other medical services	0.2	0.3
Surgical services		
Corneal surgery	0.7	0.2
Other anterior segment procedures	1.3	0.4
Glaucoma surgery	2.6	0.5
Lens-related surgery	34.3	5.6
Vitreoretinal procedures	5.8	1.1
Ocular adnexa-eyelids	1.8	1.2
Other surgical	1.9	1.3
Vision care supplies	1.3	1.9

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other".

Source: Project HOPE tabulations based on 1990 BMAD Provider File.

**Table 4-2: Medicare Part B Ambulatory Vision Care Services^a, 1990:
Percentage of Claims and Charges by Vision Care Family for
Optometrists**

<u>Vision Care Family</u>	<u>Percentage of Total Allowed Charges per Provider</u>	<u>Percentage of Claims per Provider</u>
All Families	100.0%	100.0%
Visits		
Medical visits	8.1	10.4
Consultations	0.4	0.3
Ophthalmologic visits	42.8	43.5
Diagnostic services	2.8	3.7
Diagnostic services	3.9	4.6
Diagnostic maneuvers	0.2	0.1
Ophthalmic ultrasound		
Other medical services	1.8	1.6
Surgical services		
Corneal surgery	0.0	0.0
Other anterior segment procedures	0.0	0.0
Glaucoma surgery	0.0	0.0
Lens-related surgery	0.7	0.2
Vitreoretinal procedures	0.0	0.0
Ocular adnexa-eyelids	0.1	0.1
Other surgical	0.1	0.1
Vision care supplies	38.1	34.5

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other".

Source: Project HOPE tabulations based on 1990 BMAD Provider File.

Table 4-3 presents the same data for nonvision care specialists, here primarily represented by medical supply companies, physicians with specialties in family or general practice or internal medicine, and certified prosthetists or orthotists. These nonvision care specialists appear to provide the full range of vision care services, including visits, diagnostic services, surgical services, and related medical supplies. A higher proportion of total allowed charges billed by nonvision care specialists were for regular medical visits or for other surgical services than for either ophthalmologists or for optometrists.² Slightly over one-fifth of charges and claims were attributable to the specially-coded ophthalmologic visits (less than for either of the vision care specialties), and 29 percent were charges or claims for vision care supplies.

This information can also be seen in Figures 4 and 5. These two figures present the distribution of charges and claims, respectively, by vision care family for ophthalmologists, optometrists, and others providing vision care services. Looking at Figure 4, it is clear that charges by ophthalmologists are dominated by Families 12 (lens-related surgery) and 3 (specially-coded ophthalmologic visits), while those of optometrists and other specialties are primarily accounted for by Families 3 and 17 (vision care supplies). In terms of claims (see Figure 5), Families 1 (regular medical visits) and 3 predominate for ophthalmologists, Families 1, 3, and 17 for optometrists and other providers. The remainder of the analysis focuses on episodes of vision care services; episodes are limited to those provided by an ophthalmologist.

4.2 Provider and Market Area Characteristics

Providers are examined according to the type and mix of services they deliver and their charges for those services. While the BMAD file is quite limited in terms of

² "Other surgical services" are minor surgical procedures including removal of foreign body, repair of laceration, extraocular muscle surgery, and conjunctival surgery. See the appendix for a list of CPT codes.

Table 4-3: Medicare Part B Ambulatory Vision Care Services^a, 1990: Percentage of Claims and Charges for NonVision Care Specialists^b by Vision Care Family

<u>Vision Care Family</u>	<u>Percentage of Total Allowed Charges per Provider</u>	<u>Percentage of of Claims per Provider</u>
All Families	100.0%	100.0%
Visits		
Medical visits	15.1	15.7
Consultations	1.1	1.1
Ophthalmologic visits	21.0	21.6
Diagnostic services		
Diagnostic services	2.5	2.7
Diagnostic maneuvers	7.9	9.3
Ophthalmic ultrasound	1.6	1.6
Other medical services	1.6	1.6
Surgical services		
Corneal surgery	0.3	0.3
Other anterior segment procedures	0.2	0.2
Glaucoma surgery	0.3	0.2
Lens-related surgery	4.0	2.8
Vitreoretinal procedures	0.5	0.3
Ocular adnexa-eyelids	3.8	3.3
Other surgical	10.7	10.2
Vision care supplies	29.2	29.0

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other".

^b Nonvision care specialists include provider specialties other than ophthalmology and optometry. The primary codes represented here are medical supply company, family practice, internal medicine, general practice, and certified prosthetist/orthotist.

Source: Project HOPE tabulations based on 1990 BMAD Provider File.

Figure 4
Distribution of Charges by Specialty and Procedure Family

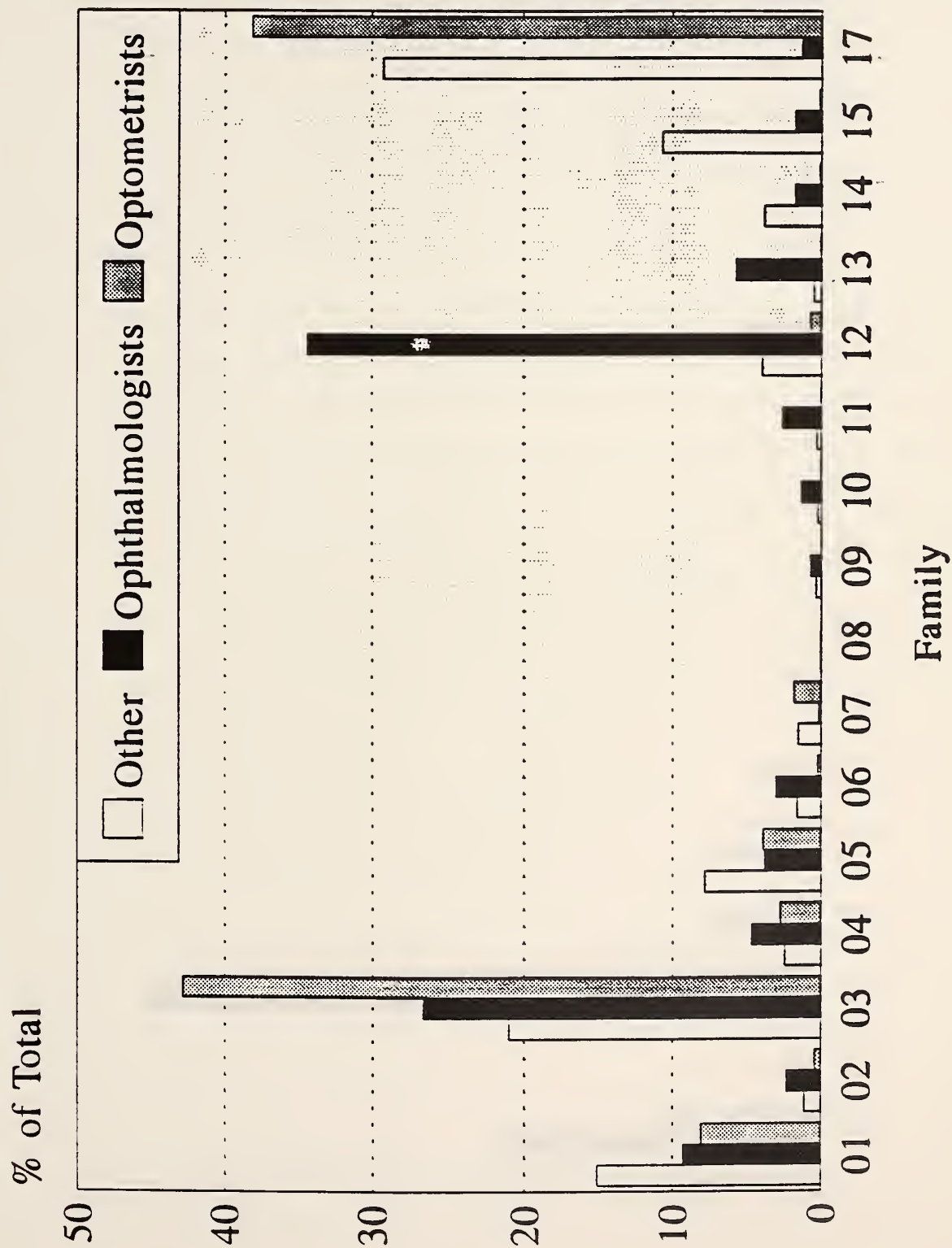
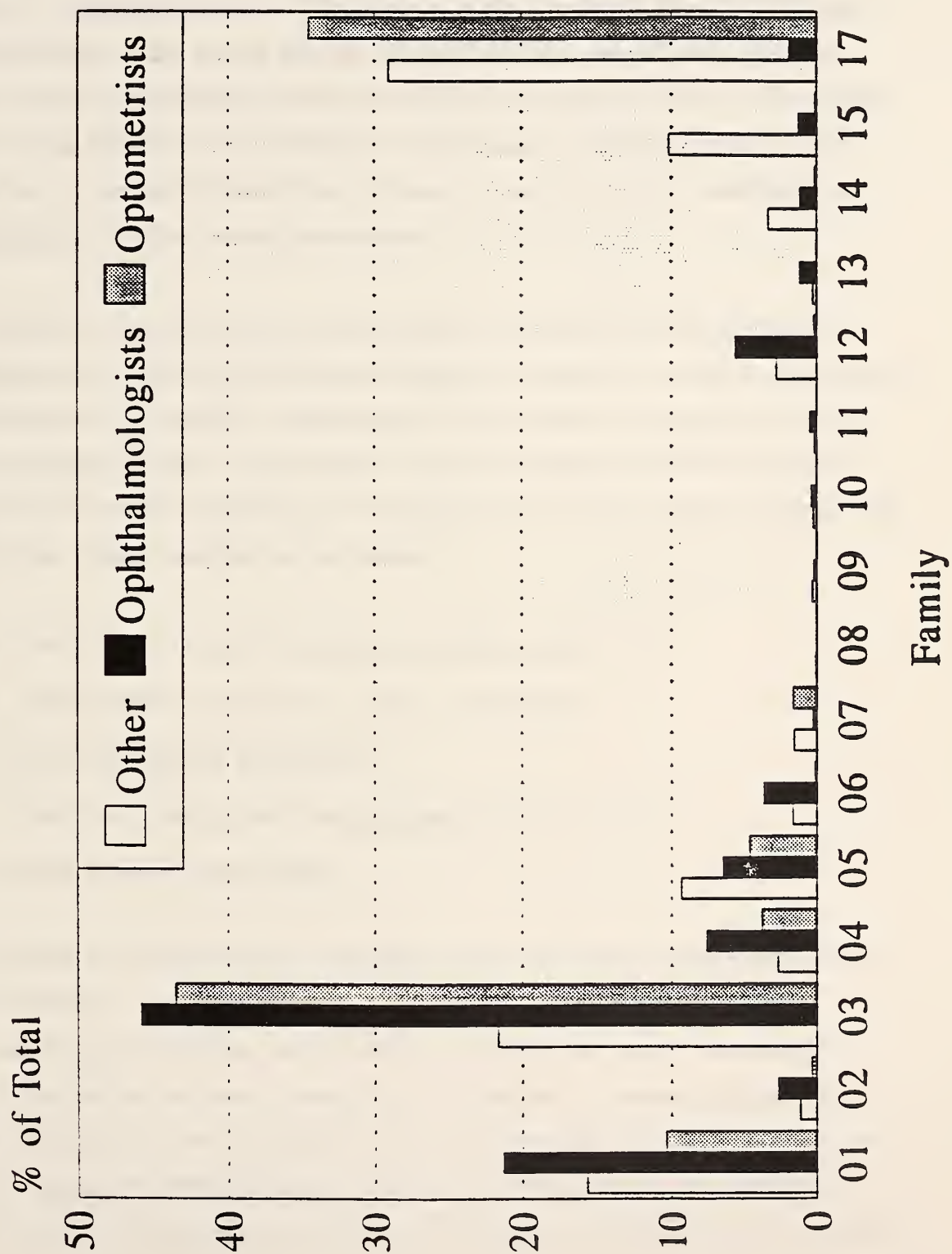


Figure 5

Distribution of Claims by Specialty and Procedure Family



provider characteristics, two variables were created to proxy the size of a physician's practice. The first -- the sum of allowed charges for all Medicare claims submitted by the provider -- represents the total dollar volume of the provider's Medicare practice. The second variable is the sum of allowed charges for vision care claims only and is intended to proxy the individual's Medicare/vision care practice. Clearly, both of these variables exclude billings for non-Medicare beneficiaries. In addition, given the non-unique nature of provider IDs described previously, these billings may understate to varying degrees a provider's actual practice size.

In order to explore variation among providers operating in different types of market areas, each of the providers has been linked by zipcode to county-level data from the Area Resource File (ARF). Approximately 1,200 counties are represented with at least one practicing provider. The variables used were chosen to represent different dimensions of the supply of health care resources in each of the counties represented on the analytic file. These variables are as follows:

- ◆ Total number of ophthalmologists providing patient care
- ◆ Total number of optometrists, active, non-federal
- ◆ Short term general hospital beds
- ◆ Number of hospitals with hospital-based outpatient care
- ◆ Rural-urban continuum code

The last variable is relatively new on the ARF, with 10 categories representing different degrees of urbanicity. We have regrouped into four categories as follows: Large metropolitan (large metropolitan core and large metropolitan fringe); Metropolitan (medium metropolitan and lesser metropolitan); Urbanized (urbanized adjacent and urbanized nonadjacent); Less urbanized/thinly populated (less urbanized adjacent, less urbanized nonadjacent, thinly populated adjacent, and thinly populated nonadjacent). Variations found in the provision of services by the degree of urbanicity may be related

to the supply of resources or may be due to differences in rates of visual disability between rural and urban areas.

In order to explore variation in the type of episode, in average allowed charges, and in other descriptors of the services provided, both providers and the counties in which they operated were categorized in several ways. For the providers, the frequency distributions of total Medicare billings and the subset of Medicare vision billings were calculated. Each of these distributions was divided into quartiles, in order to look for differences in the provision of care among providers with different levels of billings. In terms of county characteristics, the frequency distribution of the number of ophthalmologists and optometrists per county were calculated. For example, looking at the number of ophthalmologists per county, three-quarters of the providers in the analysis file practiced in counties with 8 or fewer ophthalmologists, while one-quarter were located in counties with more than 8 ophthalmologists. These are referred to in the text and noted in the tables as low and high, respectively. A similar procedure was used for the number of hospital beds, the number of hospitals with OPDs, and the degree of urbanicity.

Type of Episode. As in the beneficiary-level analysis in Section 3 of this report, all episodes were categorized according to the type of services provided within the period defined by the episode. Episodes were categorized as follows (shown in Table 4-4): (i) episodes with visit claim(s) only; (ii) episodes with visit and diagnostic claim(s) only; (iii) episodes with visit and surgery claim(s) only; (iv) episodes with visit, diagnostic, and surgery claims; and (v) other.³

³ This categorization differs from the one presented in Section 3 in one respect. In Section 3, episodes with a medical supply claim were excluded while, here, they are part of category (v). This is reflected in the greater proportion of type (v) episodes in this section.

Table 4-4: Percent Distribution of Vision Care Episodes^a by Provider Density and Type of Episode, 1990

	Episodes	Ophthalmologists ^b		Optometrists ^c	
		<u>High</u>	<u>Low</u>	<u>High</u>	<u>Low</u>
<u>All Episodes</u>	1,081,386	355,827	725,559	298,551	782,835
Episodes with visit claim(s) only	60.8%	59.9%	61.3%	60.5%	60.9%
Episodes with visit and diagnostic claim(s) only	12.5%	14.3%	11.7%	12.2%	12.7%
Episodes with visit and surgery claim(s) only	3.0%	2.7%	3.2%	2.6%	3.2%
Episodes with visit, diagnostic, and surgery claims only	2.4%	2.2%	2.5%	1.9%	2.5%
Other	21.3%	21.1%	21.4%	22.8%	20.7%

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Includes only those episodes billed by ophthalmologist(s).

^b High defined as county with more than 8 ophthalmologists per 100,000 population; low as 8 or fewer. 75 percent of providers on analysis file practicing in counties with 8 or fewer.

^c High defined as county with more than 12 optometrists per 100,000 population; low as 12 or fewer. 75 percent of providers on analysis file practicing in counties with 12 or fewer.

Source: Project HOPE tabulations based on 1990 BMAD Provider File and the 1992 Area Resource File.

Of interest in this analysis is the variation in the type of episodes between providers operating in different types of market areas. In Tables 4-4 and 4-5, three of the indicators described above are examined: density of ophthalmologists, density of optometrists, and degree of urbanicity. Of the approximately 1 million episodes analyzed, one-third (355,827) were delivered by providers practicing in geographic areas with a high density of ophthalmologists -- defined as counties with more than 8 ophthalmologists per 100,000 population.⁴ As can be seen in Table 4-4, the distribution of episodes across the five type-of-episode categories is similar for the ophthalmologists in high- and low-density counties, though providers in high-ophthalmologist counties more frequently provided diagnostic services along with visits: 14.3 percent of episodes for providers in high density counties consisted of a visit and diagnostic claim compared to 11.7 percent of episodes in low density counties. Episodes in low-ophthalmologist counties more often included surgical services. Differences in the distribution of episodes for providers practicing in counties with a high vs. low concentration of optometrists were minimal.

In Table 4-5, the distribution of episodes is presented for providers practicing in counties categorized by the degree of urbanicity. Providers in large metropolitan counties were more likely to deliver visits and diagnostic services jointly than were providers in other geographic areas: 15.1 percent of the episodes in large metropolitan counties consisted of a visit and diagnostic service compared to 9.7 to 10.8 percent for less urbanized areas. This is consistent with the previous table, since greater concentrations of ophthalmologists are more likely in more urbanized areas.⁵ Large

⁴ 25% of providers on the analysis file were operating in "high-density" ophthalmologist counties with more than 8 ophthalmologists per 100,000 population.

⁵The mechanism by which this relationship holds is not clear. One hypothesis would be that with more providers vying for patients, providers will deliver more services to each patient. This hypothesis cannot be confirmed or refuted in the current analysis. Alternatively, it has been suggested that rates of visual impairment are higher in urban areas, though evidence is limited (see Kirchner and Peterson, 1979).

Table 4-5: Percent Distribution of Vision Care Episodes^a by Degree of Urbanicity^b and Type of Episode, 1990

	<u>Episodes</u>	<u>Large Metro- politan</u>	<u>Metro- politan</u>	<u>Urbanized</u>	<u>Less Urbanized/ Thinly Populated</u>
<u>All Episodes</u>	1,081,386	477,059	386,629	129,487	87,954
Episodes with visit claim(s) only	60.8%	60.3%	60.7%	62.4%	62.0%
Episodes with visit and diagnostic claim(s) only	12.5%	15.1%	10.8%	9.7%	10.5%
Episodes with visit and surgery claim(s) only	3.0%	3.2%	2.9%	2.9%	2.1%
Episodes with visit, diagnostic, and surgery claims only	2.4%	2.4%	2.3%	2.5%	2.1%
Other	21.3%	19.0%	23.3%	22.5%	23.4%

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Includes only those episodes billed by ophthalmologist(s).

^b From the Area Resource File Rural-urban continuum code, based on county population and whether the county is contiguous to a Standard Metropolitan Statistical Area.

Source: Project HOPE tabulations based on 1990 BMAD Provider File and the 1992 Area Resource File.

metropolitan areas also had the lowest proportion of episodes with no visits (19% vs. 23% for other areas).

Charges and Claims. In Table 4-6, average allowed charges per episode and average number of claims per episode are presented for 1,386 ophthalmologists. These are calculated for the two provider billings variables and the five county level variables. Overall, average allowed charges per episode were \$186 and the average number of claims was 1.4. Providers whose total Medicare billings and Medicare vision billings are in the lowest quartile charge substantially less per episode than other providers (\$84 and \$73, respectively, compared to between \$193 and \$248). Providers with relatively low levels of either Medicare or vision care billings are more likely to be nonvision care specialists who deliver a more basic level of service. It should be emphasized that these providers are not necessarily offering services more cheaply but are providing a different bundle of services, most likely a limited range of services, probably concentrating on regular medical visits and limited diagnostic care. It is not clear why average allowed charges for providers in the third quartile are so much less than charges for those in the second and fourth quartiles.

Average allowed charges are higher for providers in counties with relatively fewer ophthalmologists (\$193 per episode compared to \$178) and lower for providers in counties with relatively fewer optometrists (\$183 vs. \$191 per episode). These higher charges may reflect the greater proportion of episodes with surgical services in low-ophthalmologist counties, seen in Table 4-4. Charges per episode also varied for providers practicing in counties with different number of hospital beds relative to the population. Providers represented in the highest quartile -- who were in counties with 677 or more beds per capita -- had the lowest average allowed charges per episode. The highest charges per episode were for providers in the second quartile, which included counties with between 342 and 491 hospital beds per capita.

Table 4-6: Average Allowed Charges and Average Number of Claims per Vision Care Episode^a for Average Provider, by Selected Characteristics, 1990

	<u>Number of Providers</u>	<u>Average Allowed Charges Per Episode</u>	<u>Average Number of Claims Per Episode</u>
<u>All Providers</u>	1386	\$186	1.4
Provider Billings for All Care ^b (By Quartiles, Ascending Order)			
1	347	\$84	1.3
2	347	\$237	1.4
3	346	\$193	1.5
4	347	\$228	1.5
Provider Billings for Vision Care ^b (By Quartiles, Ascending Order)			
1	347	\$73	1.3
2	346	\$248	1.5
3	346	\$193	1.5
4	347	\$230	1.5
Number of Ophthalmologists ^c			
High	502	\$178	1.5
Low	884	\$193	1.4
Number of Optometrists ^d			
High	405	\$191	1.4
Low	981	\$183	1.5
Hospital Beds ^e (By Quartiles, Ascending Order)			
1	279	\$188	1.4
2	360	\$216	1.5
3	381	\$178	1.4
4	366	\$163	1.4

Table 4-6: Continued: Average Allowed Charges and Average Number of Claims per Vision Care Episode^a for Average Provider, by Selected Characteristics, 1990

	<u>Number of Providers</u>	<u>Average Allowed Charges Per Episode</u>	<u>Average Number of Claims Per Episode</u>
Hospital OPDs ^f			
0 - 1	440	\$191	1.5
More than 1	946	\$183	1.4
Degree of Urbanicity ^g			
Large Metropolitan	751	\$202	1.5
Metropolitan	441	\$165	1.4
Urbanized	117	\$164	1.4
Less Urbanized/ Thinly Populated	76	\$183	1.3

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Includes only those episodes billed by ophthalmologist(s). Averages are calculated on a per episode/per provider basis.

^b Represents quartiles of the frequency distribution of providers, by the total Medicare dollars billed and Medicare dollars billed for vision services, respectively.

^c High defined as county with more than 8 ophthalmologists per 100,000 population; low as 8 or fewer. 75 percent of providers on analysis file practicing in counties with 8 or fewer.

^d High defined as county with more than 12 optometrists per 100,000 population; low as 12 or fewer. 75 percent of providers on analysis file practicing in counties with 12 or fewer.

^e Represents quartiles of the frequency distribution of providers by the number of hospital beds per capita in the county in which they operate.

^f Number of hospitals with hospital-based outpatient care in county in which provider operates.

^g From the Area Resource File Rural-urban continuum code, based on county population and whether the county is contiguous to a Standard Metropolitan Statistical Area.

Source: Project HOPE tabulations based on 1990 BMAD Provider File and the 1992 Area Resource File.

1. The first part of the paper is devoted to a general discussion of the problem of the existence of solutions of the system of equations (1) and (2) under the conditions (3) and (4).

Case 1	Case 2	Case 3	Case 4
1.1	1.2	1.3	1.4
2.1	2.2	2.3	2.4
3.1	3.2	3.3	3.4
4.1	4.2	4.3	4.4
5.1	5.2	5.3	5.4
6.1	6.2	6.3	6.4
7.1	7.2	7.3	7.4
8.1	8.2	8.3	8.4
9.1	9.2	9.3	9.4
10.1	10.2	10.3	10.4

In the case of the first part of the paper, the problem of the existence of solutions of the system of equations (1) and (2) under the conditions (3) and (4) is considered. The problem is solved by the method of the variation of constants. The results of the calculations are given in the table.

In the case of the second part of the paper, the problem of the existence of solutions of the system of equations (1) and (2) under the conditions (3) and (4) is considered. The problem is solved by the method of the variation of constants. The results of the calculations are given in the table.

In the case of the third part of the paper, the problem of the existence of solutions of the system of equations (1) and (2) under the conditions (3) and (4) is considered. The problem is solved by the method of the variation of constants. The results of the calculations are given in the table.

In the case of the fourth part of the paper, the problem of the existence of solutions of the system of equations (1) and (2) under the conditions (3) and (4) is considered. The problem is solved by the method of the variation of constants. The results of the calculations are given in the table.

Average charges per episode were somewhat lower for providers in counties with more than one hospital providing outpatient care, perhaps because these outpatient centers delivered some vision care to Medicare beneficiaries. Charges were highest in large metropolitan areas. Again, it should be noted that variations in average charges per episode are likely to be indicative of different bundles of services being provided in different locations.

Beneficiary Data. The data presented in Table 4-7 attempt to show how services and charges per beneficiary vary by these same indicators. For the ophthalmologists in the analytic file, vision care services were provided to 263 beneficiaries, on average, with 3.6 episodes and \$762 in charges per beneficiary. Providers with higher Medicare billings saw more Medicare beneficiaries, on average, with the average number of beneficiaries increasing from 5 for providers in the lowest quartile to 770 for those in the highest quartile.⁶ The range was almost identical by quartiles of Medicare vision billings. The average number of episodes per beneficiary rose sharply over the lower three quartiles -- from 1.6 to 5.6 episodes per beneficiary -- and then dropped back down somewhat for providers in the highest quartile. Average charges per beneficiary also increased substantially, from \$136 for providers in the lowest quartile to \$580 in the second quartile, and then to \$1,135 in the third quartile where they remained level.

Perhaps two conclusions can be drawn. First, the two distributions of providers -- by total Medicare billings and by Medicare vision billings -- are virtually the same. Thus, they seem to be dominated by vision care specialists and any general practitioners, for example, providing only occasional vision care services but substantial Medicare nonvision care services are not heavily represented enough to change the two distributions. Second, the providers in the higher quartiles are fundamentally different

⁶It should be reiterated that some of the providers in the highest quartile are likely to be group practices representing more than one physician.

Table 4-7: Number of Beneficiaries, Episodes per Beneficiary, and Charges per Beneficiary for Vision Care Episodes^a for Average Provider, by Selected Characteristics, 1990

	<u>Average Number of Beneficiaries</u>	<u>Average Number of Episodes per Beneficiary</u>	<u>Average Charges per Beneficiary</u>
<u>All Providers</u>	263	3.6	\$762
Provider Billings for All Care ^b (By Quartiles, Ascending Order)			
1	5	1.6	\$136
2	26	2.6	\$580
3	249	5.6	\$1135
4	770	4.4	\$1138
Provider Billings for Vision Care ^b (By Quartiles, Ascending Order)			
1	5	1.6	\$116
2	25	2.6	\$603
3	242	5.6	\$1139
4	778	4.4	\$1135
Number of Ophthalmologists ^c			
High	253	4.7	\$982
Low	268	3.0	\$640
Number of Optometrists ^d			
High	254	3.9	\$910
Low	266	3.5	\$702
Hospital Beds ^e (By Quartiles, Ascending Order)			
1	230	2.3	\$550
2	277	3.5	\$744
3	278	3.2	\$695
4	257	5.2	\$1017

Table 4-7 Continued: Number of Beneficiaries, Episodes per Beneficiary, and Charges per Beneficiary for Vision Care Episodes for Average Provider, by Selected Characteristics, 1990

	<u>Average Number of Beneficiaries</u>	<u>Average Number of Episodes per Beneficiary</u>	<u>Average Charges per Beneficiary</u>
Hospital OPDs ^f			
0 - 1	219	5.0	\$1123
More than 1	283	3.0	\$599
Degree of Urbanicity ^g			
Large Metropolitan	215	4.8	\$1077
Metropolitan	311	2.4	\$403
Urbanized	401	2.2	\$409
Less Urbanized/ Thinly Populated	246	2.0	\$389

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Includes only those episodes billed by ophthalmologist(s). Averages are calculated on a per episode/per provider basis.

^b Represents quartiles of the frequency distribution of providers, by the total Medicare dollars billed and Medicare dollars billed for vision services, respectively.

^c High defined as county with more than 8 ophthalmologists per 100,000 population; low as 8 or fewer. 75 percent of providers on analysis file practicing in counties with 8 or fewer.

^d High defined as county with more than 12 optometrists per 100,000 population; low as 12 or fewer. 75 percent of providers on analysis file practicing in counties with 12 or fewer.

^e Represents quartiles of the frequency distribution of providers by the number of hospital beds per capita in the county in which they operate.

^f Number of hospitals with hospital-based outpatient care in county in which provider operates.

^g From the Area Resource File Rural-urban continuum code, based on county population and whether the county is contiguous to a Standard Metropolitan Statistical Area.

Source: Project HOPE tabulations based on 1990 BMAD Provider File and the 1992 Area Resource File.

than those in the lower quartiles, in that they not only provide care to a larger number of beneficiaries but they provide a different magnitude of services.

In terms of the level of services provided to beneficiaries, the density of ophthalmologists and of optometrists operate similarly. Beneficiaries who obtain care from providers in counties with higher concentrations of these specialists receive more episodes, on average, and have charges that are approximately 30 percent higher.⁷ Average charges per beneficiary almost double (from \$550 to \$1,017) for beneficiaries with providers in counties with fewer hospital beds per capita compared to those in counties with a higher bed to population ratio.

On the other hand, providers who practice in counties with more than one hospital providing outpatient services provide fewer episodes per beneficiary with substantially lower average costs. As mentioned previously, these outpatient departments may act as substitute providers. In terms of the degree of urbanicity of the setting in which providers practice, those in large metropolitan areas distinguish themselves by providing twice as many episodes per beneficiary with average charges per beneficiary that are also twice as high as in other settings (\$1,077 vs. approximately \$400).

Type of Service. In this final section of the report, we examine how the likelihood of providing a given type of service varies by provider and county characteristics. The proportion of a provider's total charges from regular medical visits, specially-coded ophthalmologic visits, and surgical services is presented in Table 4-8. For all providers in the analytic file, these services represent, on average, 9.2, 26.6, and 48.7 percent of charges, respectively. As suggested in the discussion of Tables 4-6 and 4-7, it is clear that providers with lower levels of total Medicare billings are providing a different combination of services than those with higher levels. For providers in the lowest

⁷Remember that it was per-episode charges that were higher for beneficiaries in counties with a lower supply of ophthalmologists.

Table 4-8: Percent of Charges from Selected Vision Care Families for Vision Care Episodes^a for Average Provider, by Selected Characteristics, 1990

	Percent of Charges From Regular Medical Visit^h	Percent of Charges From Ophthal- mologic Visitⁱ	Percent of Charges From Surgery
<u>All Providers</u>	9.2	26.6	48.7
Provider Billings for All Care ^b (By Quartiles, Ascending Order)			
1	17.9	49.8	12.5
2	7.1	19.7	57.1
3	7.5	22.3	56.5
4	4.4	14.5	68.8
Provider Billings for Vision Care ^b (By Quartiles, Ascending Order)			
1	19.1	50.6	10.1
2	5.9	18.6	59.0
3	7.4	22.9	56.0
4	4.5	14.2	69.9
Number of Ophthalmologists ^c			
High	8.5	28.4	45.6
Low	9.7	25.5	50.5
Number of Optometrists ^d	10.5	25.8	47.5
Low	8.7	26.9	49.2
Hospital Beds ^e (By Quartiles, Ascending Order)			
1	10.4	24.5	52.6
2	9.1	25.6	49.5
3	8.4	27.2	48.1
4	9.3	28.4	45.7

Table 4-8 Continued: Percent of Charges from Selected Vision Care Families for Vision Care Episodes^a for Average Provider, by Selected Characteristics, 1990

	Percent of Charges From Regular Medical Visit^h	Percent of Charges From Ophthal- mologic Visitⁱ	Percent of Charges From Surgery^j
Hospital OPDs ^f			
0 - 1	8.5	28.1	46.2
More than 1	9.5	25.9	49.9
Degree of Urbanicity ^g			
Large Metropolitan	8.9	27.1	46.4
Metropolitan	9.8	27.0	49.7
Urbanized	9.0	21.6	56.9
Less Urbanized/ Thinly Populated	10.3	26.1	53.9

^a Limited to the following service sites: physician office, hospital outpatient department, ambulatory surgery center, and "other". Includes only those episodes billed by ophthalmologist(s).

^b Represents quartiles of the frequency distribution of providers, by the total Medicare dollars billed and Medicare dollars billed for vision services, respectively.

^c High defined as county with more than 8 ophthalmologists per 100,000 population; low as 8 or fewer. 75 percent of providers on analysis file practicing in counties with 8 or fewer.

^d High defined as county with more than 12 optometrists per 100,000 population; low as 12 or fewer. 75 percent of providers on analysis file practicing in counties with 12 or fewer.

^e Represents quartiles of the frequency distribution of providers by the number of hospital beds per capita in the county in which they operate.

^f Number of hospitals with hospital-based outpatient care in county in which provider operates.

^g From the Area Resource File Rural-urban continuum code, based on county population and whether the county is contiguous to a Standard Metropolitan Statistical Area.

^h Includes charges from Family 1 claims.

ⁱ Includes charges from Family 3 claims.

^j Includes charges from Families 9-16.

Source: Project HOPE tabulations based on 1990 BMAD Provider File and the 1992 Area Resource File.

quartile, 17.9 percent of charges are attributable to regular medical visits, 49.8 percent to ophthalmologic visits, and only 12.5 percent to surgical services. In striking contrast, for providers in the highest quartile of total billings, only 18.9 percent of all charges are accounted for by either type of visit while 68.8 percent of charges are from surgery.

There is less variation in the type of services provided by the density of vision care specialists. For providers operating in high vs. low ophthalmologist counties, the proportion of charges from visits is similar -- 36.9 and 35.2 percent, respectively -- though providers in high density areas are slightly more likely to use the special ophthalmologic visit code. These providers obtain a somewhat smaller proportion of their total revenues from surgical services. The relative density of providers may be correlated with the number of hospital beds; providers in counties with more hospital beds also obtain a somewhat smaller percentage of total charges from surgery. In contrast, the proportion of charges accounted for by surgery decreases as the level of urbanicity increases.

5. CONCLUSION

The purpose of this report was to describe the findings from a study of the vision care services provided on an outpatient basis to Medicare beneficiaries. Claims data were analyzed from both the BMAD Beneficiary and Provider Files in order to provide a complete picture of: the range and frequency of vision care services provided to Medicare beneficiaries; the extent to which these services are provided by ophthalmologists, optometrists, and other nonvision care specialists; the level of vision care services per beneficiary and how that varies by demographic characteristics; and the impact of the supply of health care resources on the type and amount of services billed.

Using episodes of care created for all Medicare beneficiaries who received any vision care services in 1990, descriptive statistics were presented. Claims data from almost 540,000 beneficiaries were analyzed; extrapolating to the entire Medicare population, this represents approximately 11 million persons or one-third of all beneficiaries receiving at least one vision care service. In addition, episodes of care were constructed from the Provider File for all beneficiary-provider pairs represented.

Considerable variation was found in the delivery of vision care services according to patient demographics, provider specialty, site of care, and the level of health resource supply. Average allowed charges per beneficiary receiving care were \$351, on average, in 1990. Charges for nonwhites, however, were markedly higher than those for whites, with mean charges of \$442 for blacks, \$421 for other nonwhites, and \$343 for whites. While the BMAD files provide no diagnostic information to measure condition or severity, these crude differences suggest that nonwhites are receiving more services or different types of services than their white counterparts.

In fact, charges for blacks remain higher in some cases than those for whites even after controlling for site of care and provider specialty. For services delivered in a

physician's office and/or by an ophthalmologist, average allowed charges per beneficiary receiving services were higher for blacks than for whites. Episodes of care for blacks compared to whites were also more likely to include diagnostic services along with a visit. As mentioned earlier, racial differences in the incidence of visual impairment have been noted in the literature though the subject has not been extensively treated. Given the differences found in this study, it is of particular note that blacks accounted for 8.7 percent of the 1990 Medicare population, but only 5.7 percent of the beneficiaries receiving vision care services. These preliminary findings suggest the need for further exploration.

As might be expected, vision care services are, in the vast majority of cases, delivered by ophthalmologists. Two-thirds of beneficiaries receiving vision care services saw an ophthalmologist exclusively and 77 percent of beneficiary-level vision care episodes were delivered by ophthalmologists. In comparison to optometrists, the distribution of episodes provided by ophthalmologists includes a relatively smaller proportion of visit-only episodes and, not surprisingly, more episodes with surgical claims.

While, overall, nonvision care specialists deliver a very small proportion of care -- less than 3 percent of episodes exclusive of medical supplies -- those episodes are much less likely to include visits. For episodes with one or more diagnostic claims, providers other than ophthalmologists or optometrists account for 3.1 percent of episodes, but 8.1 percent of episodes which include a separate claim for a diagnostic maneuver other than a visual field exam. An exploration of the specific codes billed by these "other" providers might be worthwhile.

In terms of the special ophthalmological visit codes, ophthalmologists, of course, are the most frequent users. When episodes with one or more visits were examined separately, ophthalmologists are shown to account for 79 percent of episodes, optometrists for 13.5 percent of episodes, and other specialties for 1.8 percent. Interestingly, for episodes including one of the two ophthalmologic visit codes for new

patients, a slightly smaller proportion -- 70 percent -- of episodes are attributable to ophthalmologists, with 24.1 percent and 2.8 percent attributable to optometrists and other specialties, respectively. Thus, optometrists, in particular, and nonvision care specialists, to a lesser degree, do use these special visit codes and appear to provide some entry to the vision care system. As further evidence of the use of these codes, data from the Provider File indicate that 43 percent of the Medicare vision charges paid to the average optometrist and 21 percent of charges for nonvision care specialists who provide vision care services were for the specially-coded ophthalmologic visits.

Differences in services delivered were also apparent when examined by specific indicators related to the provider's practice and to the market in which the provider practiced. Again, it should be emphasized that the lack of diagnostic information limits the inferences that can be drawn from these variations; observed differences could be due to market conditions or to differences in the prevalence of specific conditions. Regardless of the underlying cause, some variation was apparent and is indicative of the need for further research.

For example, episodes of care delivered by ophthalmologists practicing in counties with a higher concentration of ophthalmologists were somewhat more likely to consist of a visit and diagnostic service than were episodes in other counties. These episodes had slightly lower average charges, but more episodes were delivered to each beneficiary so that average charges per beneficiary were substantially higher. As noted, this relationship could be explained in one of two ways. One hypothesis is that with more providers vying for patients in the high concentration areas, providers deliver more services to each patient to maintain revenues. Alternatively, the concentration of ophthalmologists may be correlated with population density and urbanization and rates of visual impairment may differ in urban versus rural areas. These hypotheses cannot be confirmed or refuted in the current analysis.

One additional avenue for further research should be noted. Using the database developed for this study, it would be possible to explore more specifically the potential impact of bundling reimbursement for vision care visits and diagnostic services. In the current study, some initial work was done. Episodes were categorized into those with visits only, those with visits plus diagnostic services, and those with other services as well. In addition, episodes with one or more visits as well as episodes with one or more diagnostic claims were examined. There were almost 850,000 of the former and just over 200,000 of the latter, with average allowed charges per episode of \$135 and \$340, respectively. In order to assess the impact of bundling, further analysis of the range in charges is needed and the frequency of the delivery of each type of episode by the same providers. Any bundled reimbursement would be likely to penalize providers who deliver more diagnostic services relative to those who deliver visits only; without the ability to control for severity, any move to establish this type of incentive requires serious examination.

Given the broad focus of this analysis and the unavailability of diagnostic information in the database, many of the findings are only general indications of differences in the level or type of care received. Moreover, problems with the BMAD Provider File in terms of the lack of a unique provider identification number clearly limit analysis of that database. Despite these difficulties, findings from this study present a broad range of information about the delivery of vision care services to the Medicare population and suggest numerous areas for further exploration.

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APPENDIX A:
VISION CARE FAMILIES

Vision Care Families

<u>Type of Service</u>	<u>Family</u>	<u>CPT Codes</u>
Office Visits	1	
Office medical services, new patient, any level		90000, 90010, 90015 90017, 90020
Office medical services established patient, minimal, brief, or limited		90030, 90040, 90050
Office medical services established patient, intermediate, extended, or comprehensive		90060, 90070, 90080
Initial or Follow-up Consultations	2	
		90600, 90605, 90610 90620, 90630, 90640-90643 90650-90654
Ophthalmologic Visits	3	
Ophthalmological services, new patient		92002, 92004
Ophthalmological services, established patient		92012, 92014
Diagnostic Services	4	
Ophthalmoscopy, extended		92225, 92226
Ophthalmoscopy, with angioscopy		92230, 92235, 92250 92260
Other diagnostic		92018, 92019, 92020

<u>Type of Service</u>	<u>Family</u>	<u>CPT Codes</u>
Diagnostic Maneuvers	5	
Visual field exams		92081, 92082, 92083
Other maneuvers		92060, 92065, 92100, 92120, 92130, 92140, 92265, 92270, 92275, 92280-92287, 92499
Ophthalmic Ultrasound	6	
		76511, 76512, 76513, 76516, 76519, 76529
Other Medical Services Including:	7	
contact lens service, spectacle services, ocular prosthetics, radiology, allergy testing		92070, 92310-92326, 92391, 92396, 92340-92390, 92392, 92395, 92330-92335, 92393, 70030, 78655, 95060
Corneal Surgery	9	
		65710, 65730, 65750, 65300, 65400, 65410, 65420, 65426, 65430, 65435, 65436, 65450, 65600, 65760, 65765, 65767, 65770, 65772 65775

<u>Type of Service</u>	<u>Family</u>	<u>CPT Codes</u>
Other Anterior Segment Procedures	10	65800, 65805, 65810, 65815, 65870, 65875, 65880, 65900, 65920, 65930, 66020, 66030, 66130, 66220, 66225, 66250, 66500, 66505, 66600, 66605, 66625, 66630, 66635, 66680, 66682, 66700, 66701, 66720, 66721, 66740, 66741, 66761, 66762, 66770
Glaucoma Surgery	11	65820, 65825, 65830, 65850, 65855, 65865, 65150, 66155, 66160, 66165, 66170
Lens-Related Surgery, including cataract removal and lens	12	66983, 66984, 66800, 66801, 66820, 66821, 66830, 66840, 66850, 66915, 66920, 66930, 66940, 66985, 66999
Vitreo-Retinal Procedures	13	67208, 67210, 67218, 67227, 67228, 67005, 67010, 67015, 67025, 67030, 67031, 67036, 67038, 67040, 67101, 67105, 67107, 67108, 67109, 67112, 67115, 67120, 67121, 67141, 67145, 67250, 67255, 67299

<u>Type of Service</u>	<u>Family</u>	<u>CPT Codes</u>
Ocular Adnexa-Eyelids	14	67700, 67710, 67715, 67800, 67801, 67805, 67808, 67810, 67820, 67825, 67830, 67835, 67840, 67850, 67880, 67882, 67901, 67902, 67903, 67904, 67906, 67907, 67908, 67909, 67911, 67914, 67915, 67916, 67917, 67921, 67922, 67923, 67924,
Other Surgical Services including:	15	
Minor surgical procedures, Removal of foreign body, Repair of laceration, Extraocular muscle surgery, Conjunctival surgery		65205-65222, 65430, 65230-65265 65270-65290 67311-67399 68020-68399 11440-15823 65091-65114 65130-65175 67400-67450 67500-67599 67930-67999 68400-68440 68500-68550 68700-68770 68800-68899
Anesthesia Procedures	16	00140-00148
Vision care Supplies	17	V0000-V2799
Non-Vision Care Services	18	Included only if determined to be part of vision care episode.



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